SUMMARY REPORT

SANTA CLARA VALLEY WATER DISTRICT
Groundwater Vulnerability Pilot Study

INVESTIGATION OF MtBE OCCURRENCE ASSOCIATED WITH OPERATING UST SYSTEMS

Volume 2 of 3
Site Reports 470 to 598
Part 2 of 2

July 22, 1999
6730.00-01

LFR
LEVINE•FRICKE
1900 POWELL STREET, 12TH FLOOR
EMERYVILLE, CALIFORNIA 94608-1827
(510) 652-4500/Fax (510) 652-2246

TD427O7.I 591999p v.2bc.1

470

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 470

United States Postal Service
1175 Branham Lane
San Jose, California 95198

April 23, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to approximately 22 to 30 feet below ground surface (bgs) underlain by interbedded sands, gravels and silts. The shallowest depth to water measured was approximately 23 feet bgs (November 1998).

SYSTEM DESCRIPTION

The UST system at the site consists of one 10,000-gallon double-walled fiberglass gasoline UST with fiberglass reinforced plastic [FRP] exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping leak detection and UST leak detection.

RESULTS

MtBE was detected in 1 of 16 soil-gas samples at a concentration of 0.015 μg/l. No MtBE was detected in soil or groundwater samples collected from this site. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 3 of 16 soil-gas samples at concentrations up to 4.5 μg/l (ethylbenzene). Petroleum hydrocarbons were not detected in soil or groundwater samples collected from this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	1
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

10/13/98/npd-see form B, reviewed file

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available? No

Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Float switch
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Fair
Condition of UST flex line sump:	Good
Vapor recovery system:	Not available
Years of operation since upgrade:	Approximately 4 years
Years of operation as fueling facility:	Approximately 4 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Liquid probe in sump was functionally tested.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	None maintained
Personnel training:	Not noted

Comments:

System appeared to be in relatively good condition. No spills, drips or leaks were apparent.

SITE INSPECTION

Condition of apron around pumps:	Fair

Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	Toward two storm drains to north and to other storm drains to southeast
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Mobile repair vehicle (MRV?). Services vehicles located ~ 23' southwest of tanks
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

On-site postmaster not available for site inspection.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1

Date installed:	5/19/94
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Suction, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #470
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
470-SG-01	11/12/98	5	<5	100	<1	<1	<1	<1	<1	
470-SG-01-SPL		5	0.015 J	NA	0.0081 J	0.023	0.0071 J	0.019 J	0.0075 J	(a)
470-SG-01		12.5	<5	<100	<1	<1	<1	<1	<1	
470-SG-02	11/12/98	5	<5	<100	<1	<1	4.5	<1	<1	
		12.5	<5	120	<1	<1	<1	<1	<1	
470-SG-03	11/12/98	5	<5	130	<1	<1	<1	<1	<1	
		12.5	<5	<100	<1	<1	<1	<1	<1	
470-SG-04	11/12/98	5	<5	120	<1	2.5	<1	<1	<1	
470-SG-04-DUP		5	<5	120	<1	<1	<1	<1	<1	
470-SG-04		13	<5	120	<1	<1	<1	<1	<1	
		21	<5	120	<1	<1	<1	<1	<1	
470-SG-05	11/12/98	5	<5	100	<1	<1	<1	<1	<1	
		13	<5 UJ	<100 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	
470-SG-06	11/12/98	5	<5	160	<1	<1	<1	<1	<1	
		12.5	<5	110	<1	<1	<1	<1	<1	
		21	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.034 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #470
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
470-BH-01	11/18/98	7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
470-BH-02	11/18/98	7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
470-BH-03	11/19/98	8.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
470-BH-04	11/18/98	7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
470-BH-05	11/19/98	9.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		24.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 470
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
470-BH-01	11/18/98	28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
470-BH-01-DUP		28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
470-BH-02	11/18/98	28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
470-BH-03	11/19/98	28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
		37.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
470-BH-04	11/18/98	33.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
470-BH-05	11/19/98	29.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

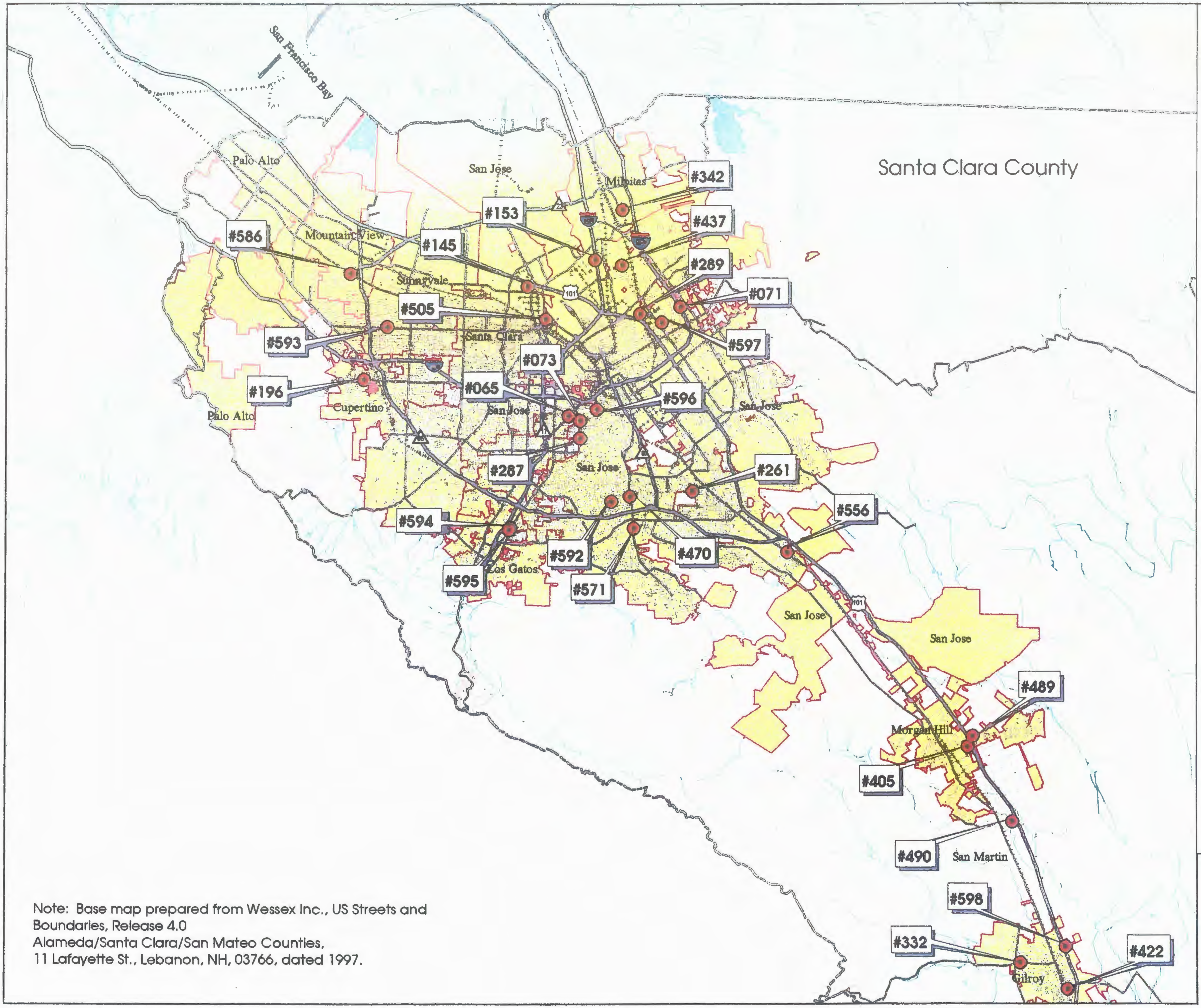
Table 4
Summary of Physical Parameters for Soil Samples - Site #470
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
470-BH-01	8.0 - 8.5	Brown silty clay	0.35	18.99	119.5	110.4	40.39
	25.0 - 25.5	Brown silty clay with gravel & carbon nodules	0.07	17.57	135.4	115.2	31.61

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

● Site Location

🟨 City within Santa Clara County

Santa Clara County Boundary

Rivers, Creeks, and Streams

═ Freeway

— Principal Arterials

- - - Local Streets and Roads

Railroad Lines

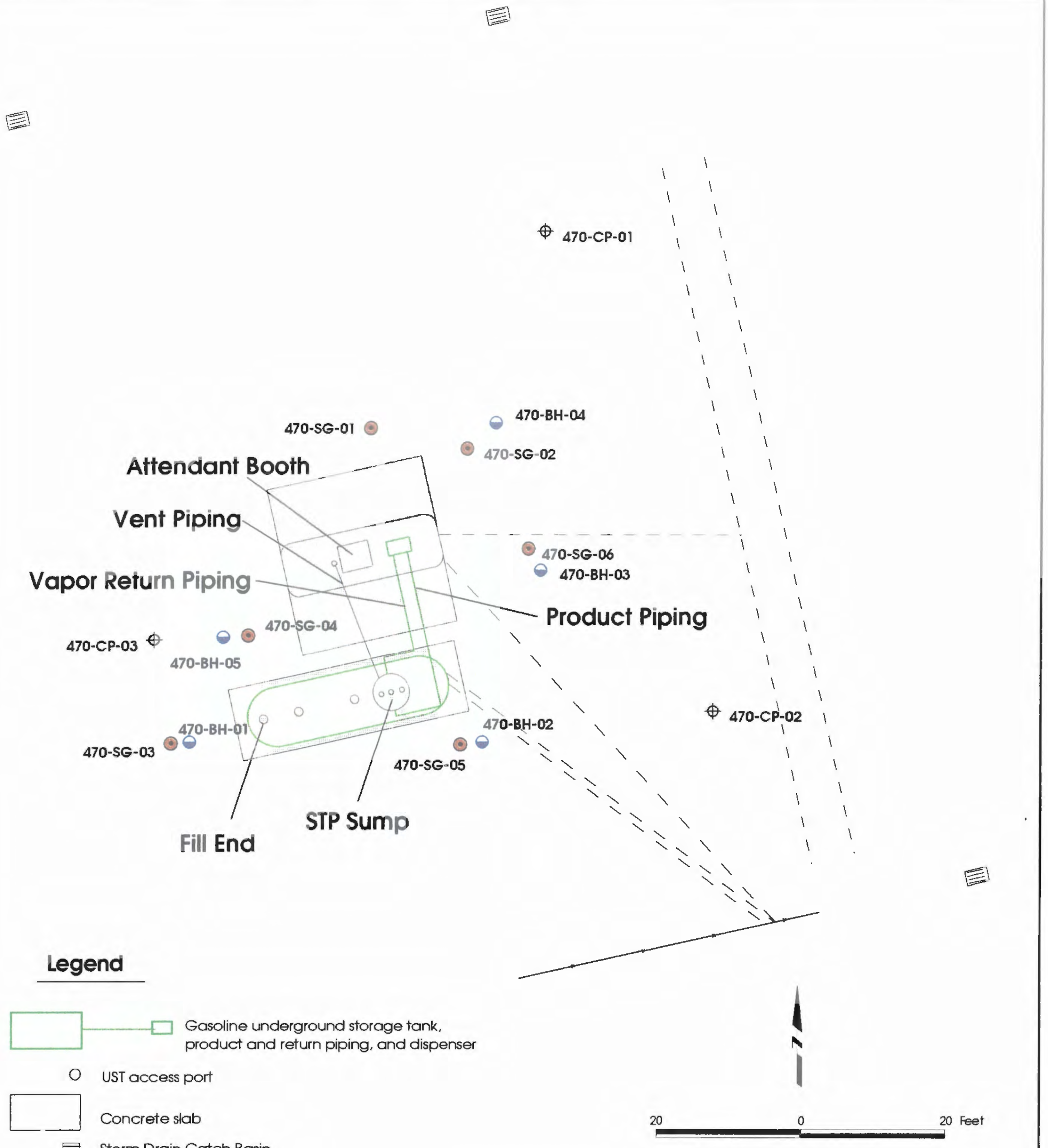
3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Tank and Fuel Island Detail, Figure 3, Robertsville Station Post Office, San Jose, CA, by Lowney Associates, dated June 1994.

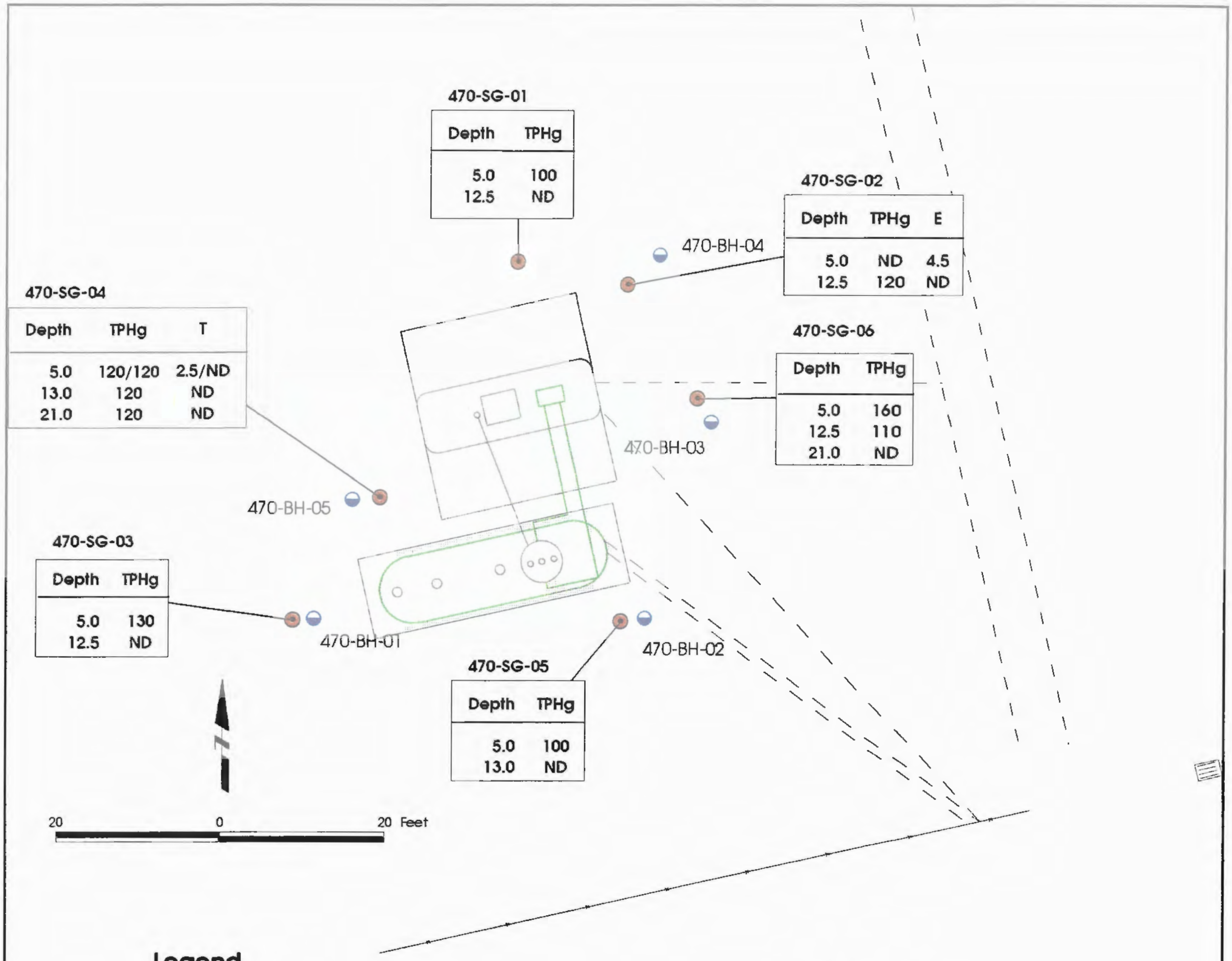
Site #470

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



470-SG-01

Depth	TPHg
5.0	100
12.5	ND

470-SG-02

Depth	TPHg	E
5.0	ND	4.5
12.5	120	ND

470-SG-04

Depth	TPHg	T
5.0	120/120	2.5/ND
13.0	120	ND
21.0	120	ND

470-SG-06

Depth	TPHg
5.0	160
12.5	110
21.0	ND

470-SG-03

Depth	TPHg
5.0	130
12.5	ND

470-SG-05

Depth	TPHg
5.0	100
13.0	ND

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-SG-01

Depth	m/p-X	T
5.0 12.0	2.5 1.0/1.2	4.1 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

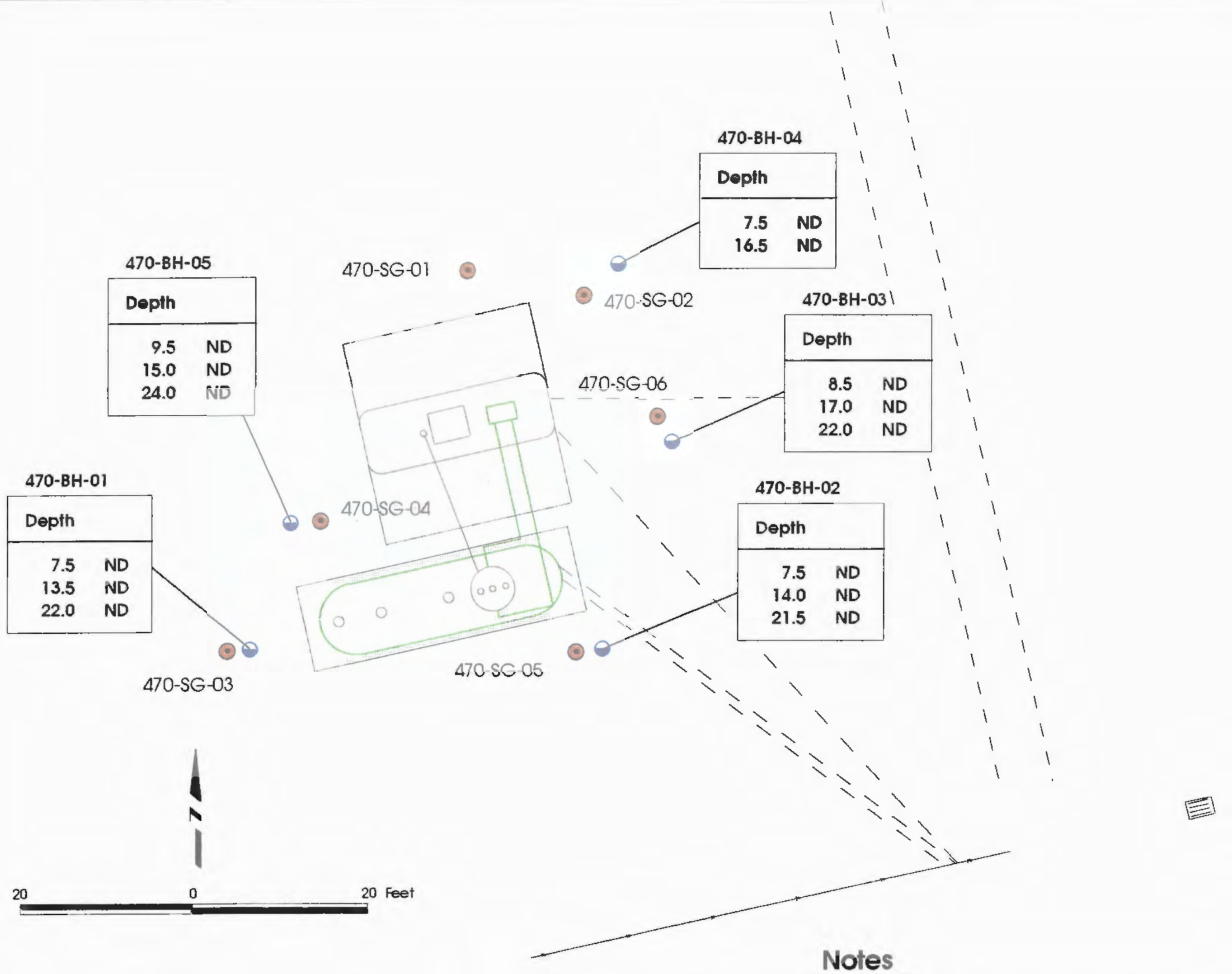
Site #470

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3

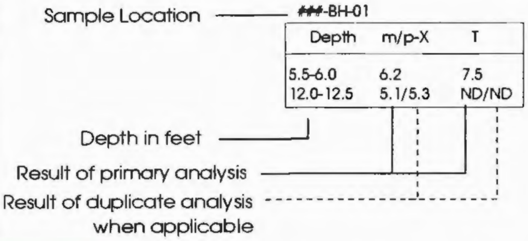


Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

- - - - Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

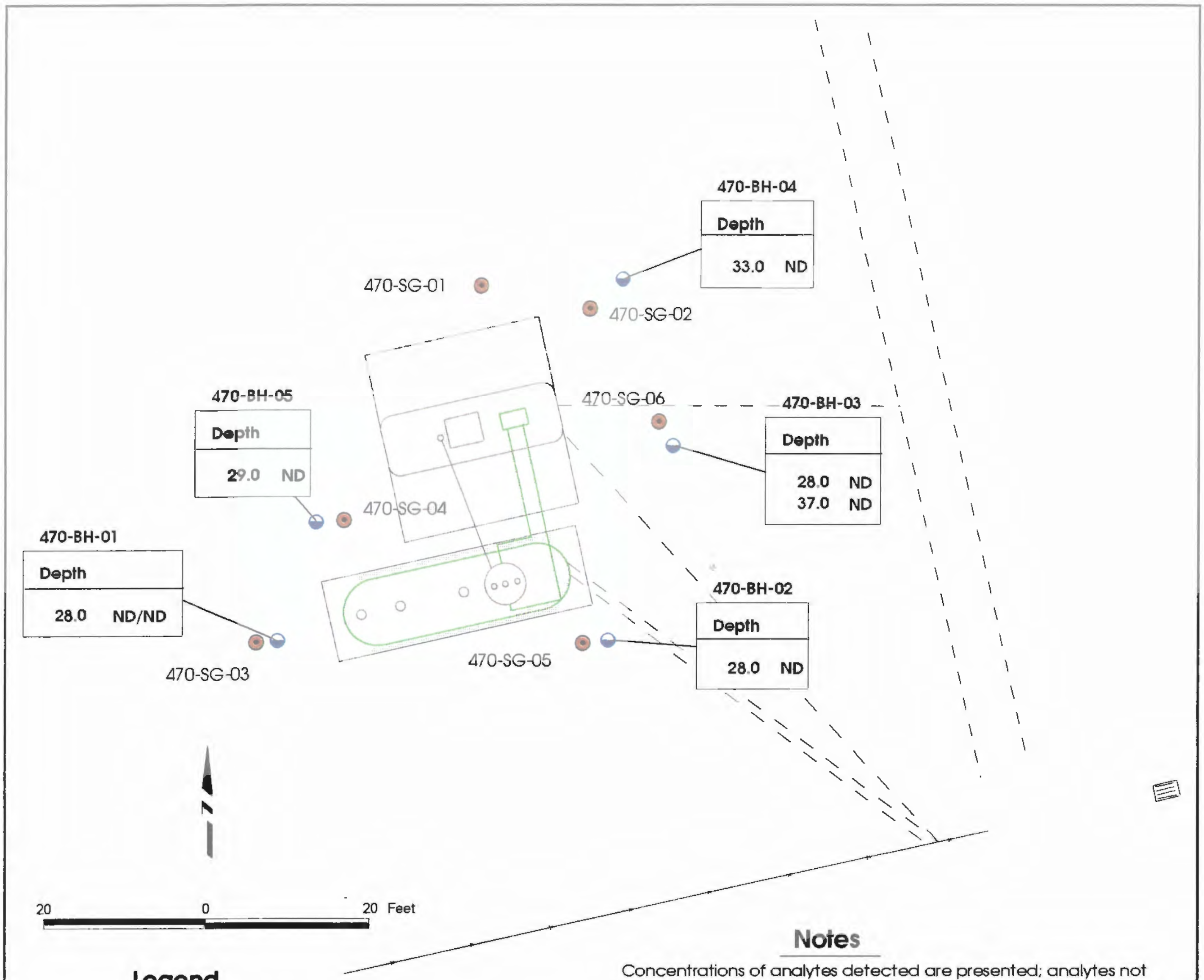
Site #470

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 4

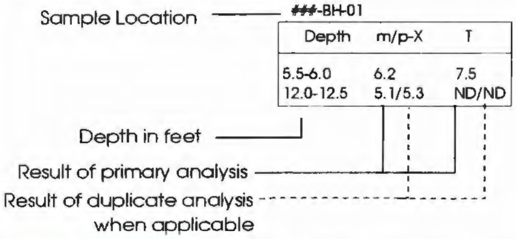


Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

- - - - Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

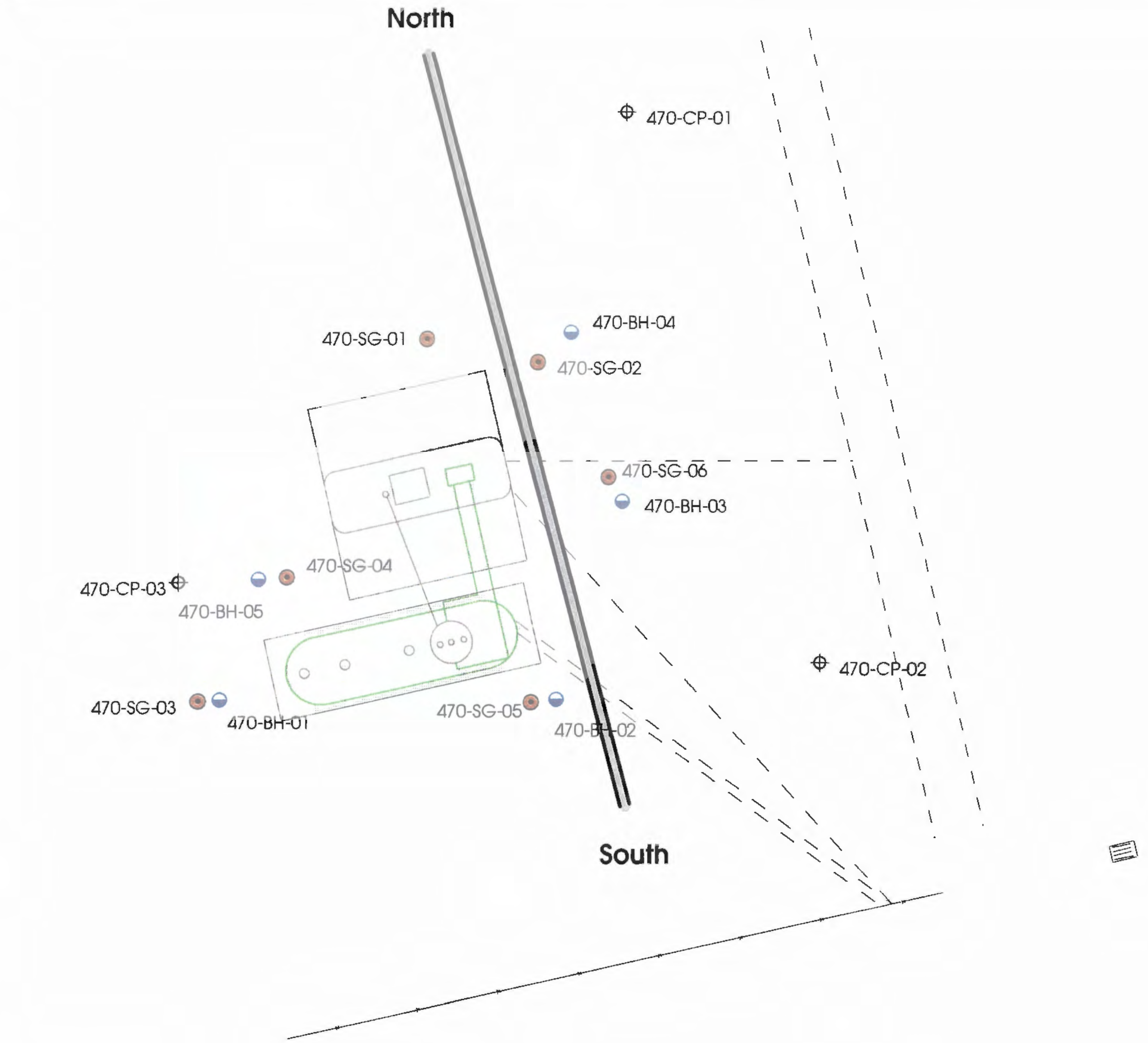
Site #470

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

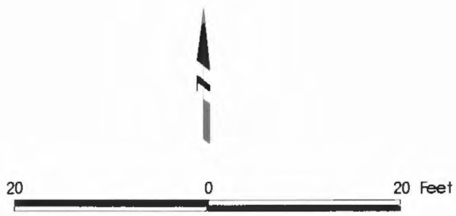
LFR
LEVINE•FRICKE

Figure 5



Legend

- 🟩 Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- ☐ Concrete slab
- ▤ Storm Drain Catch Basin
- — — — Underground utilities
- ◒ Soil and groundwater sampling location
- ● Soil-gas sampling location
- ⊕ Cone-penetrometer test location



See Figure 2 for description of site features and origin of base map.

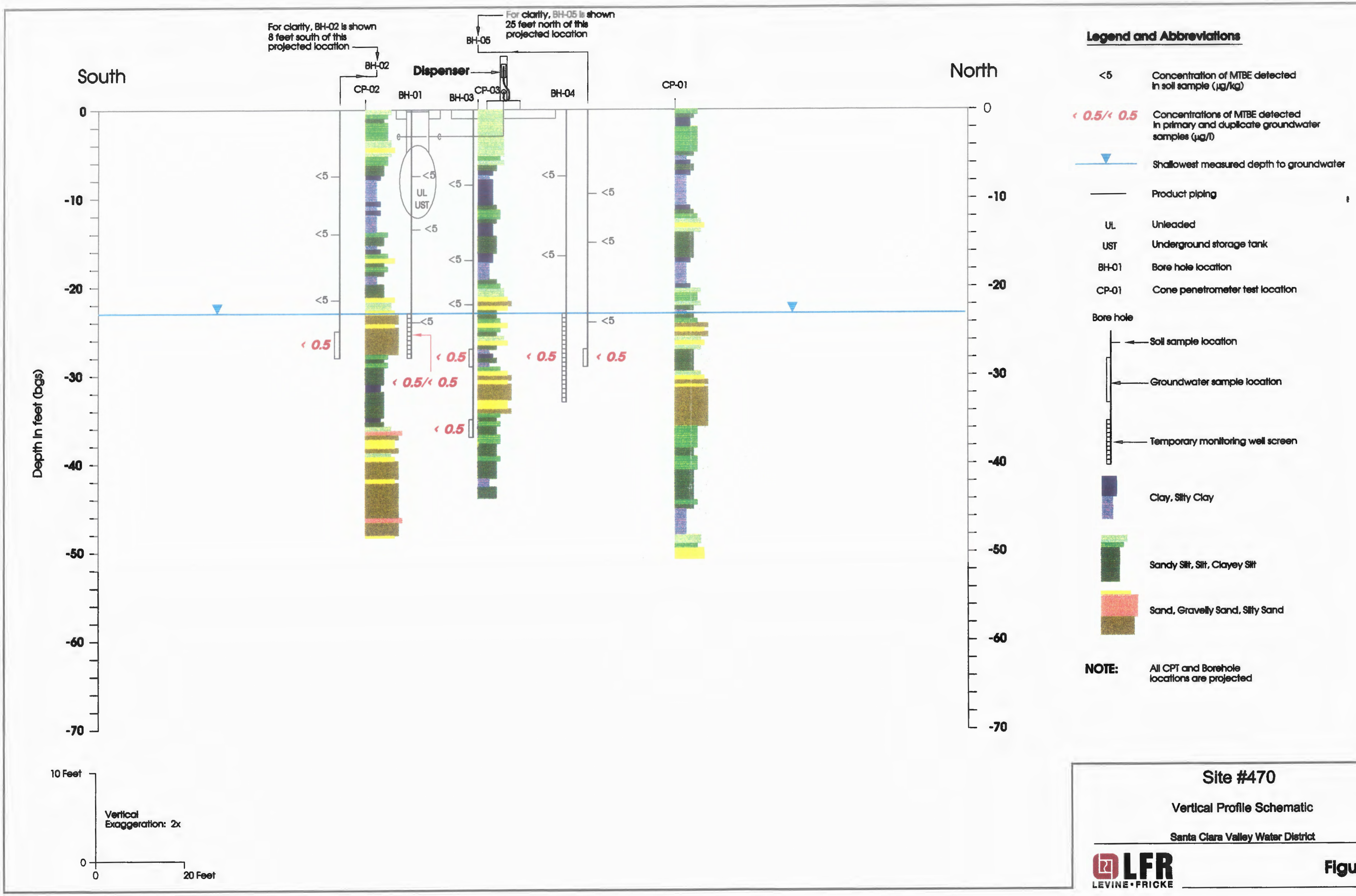
Site #470

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6


For clarity, BH-02 is shown 8 feet south of this projected location
For clarity, BH-05 is shown 25 feet north of this projected location
BH-05
BH-02
Dispenser
South
North
CP-02
BH-01
BH-03
CP-03
BH-04
CP-01
UL
UST
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
<5
< 0.5
< 0.5/< 0.5
10 Feet
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
< 0.5/< 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UL Unleaded
UST Underground storage tank
BH-01 Bore hole location
CP-01 Cone penetrometer test location
Bore hole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected

J:\ENGCAD\6730\CM#470.DWG 04/21/99 CM#505.PCP

Site #470

Vertical Profile Schematic

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

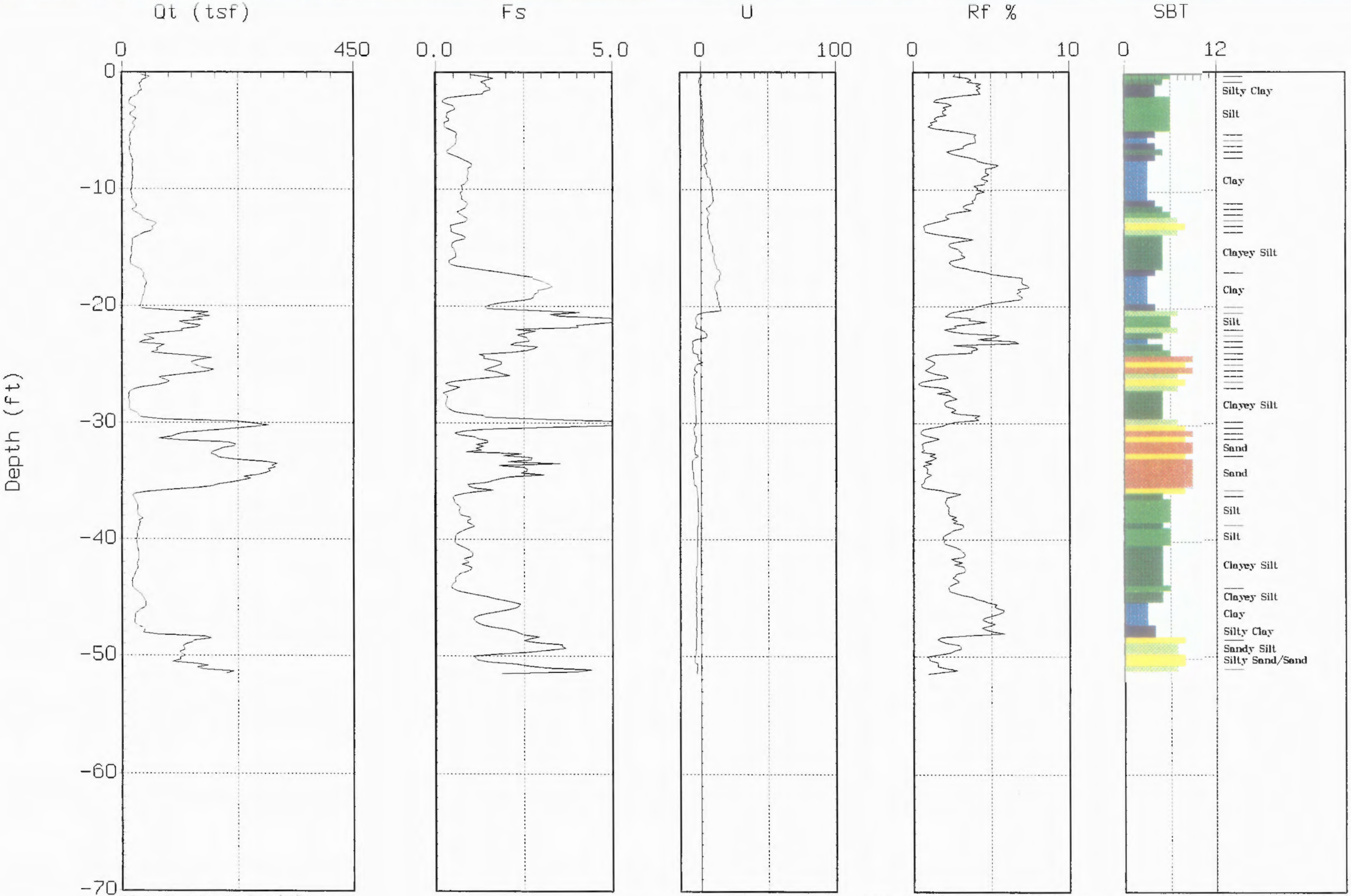
Figure 7

GREGG

LFR LEVINE.FRICKE

Site: #470
Location : 470-CP-01

Geologist: Andy Lojo
Date : 11:03:98 09:57



Max. Depth: 51.51 (ft)

Depth Inc.: 0.164 (ft)

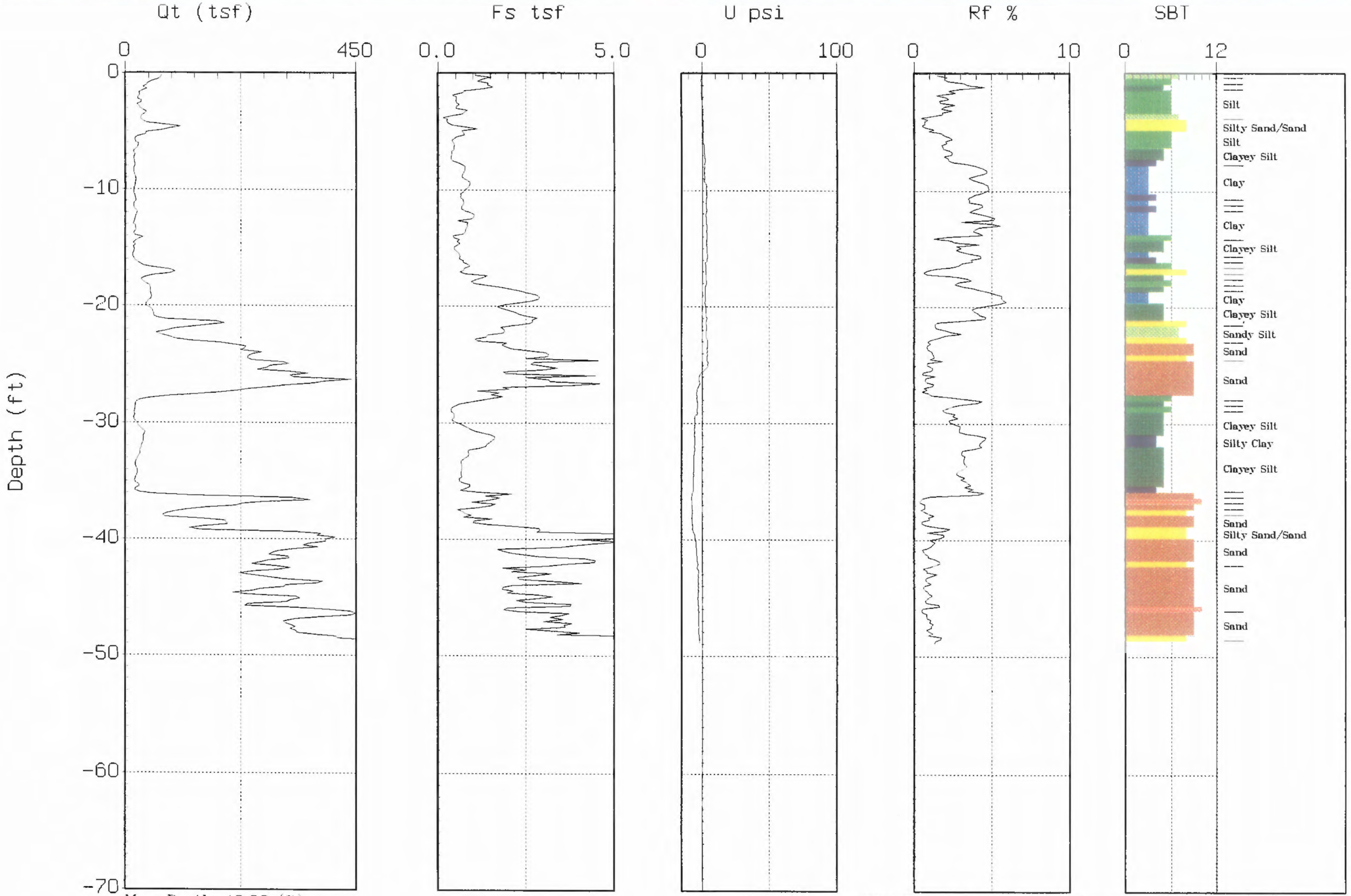
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #470
Location : 470-CP-02

Geologist: Andy Lojo
Date : 11:03:98 11:50



Max. Depth: 48.88 (ft)

Depth Inc.: 0.164 (ft)

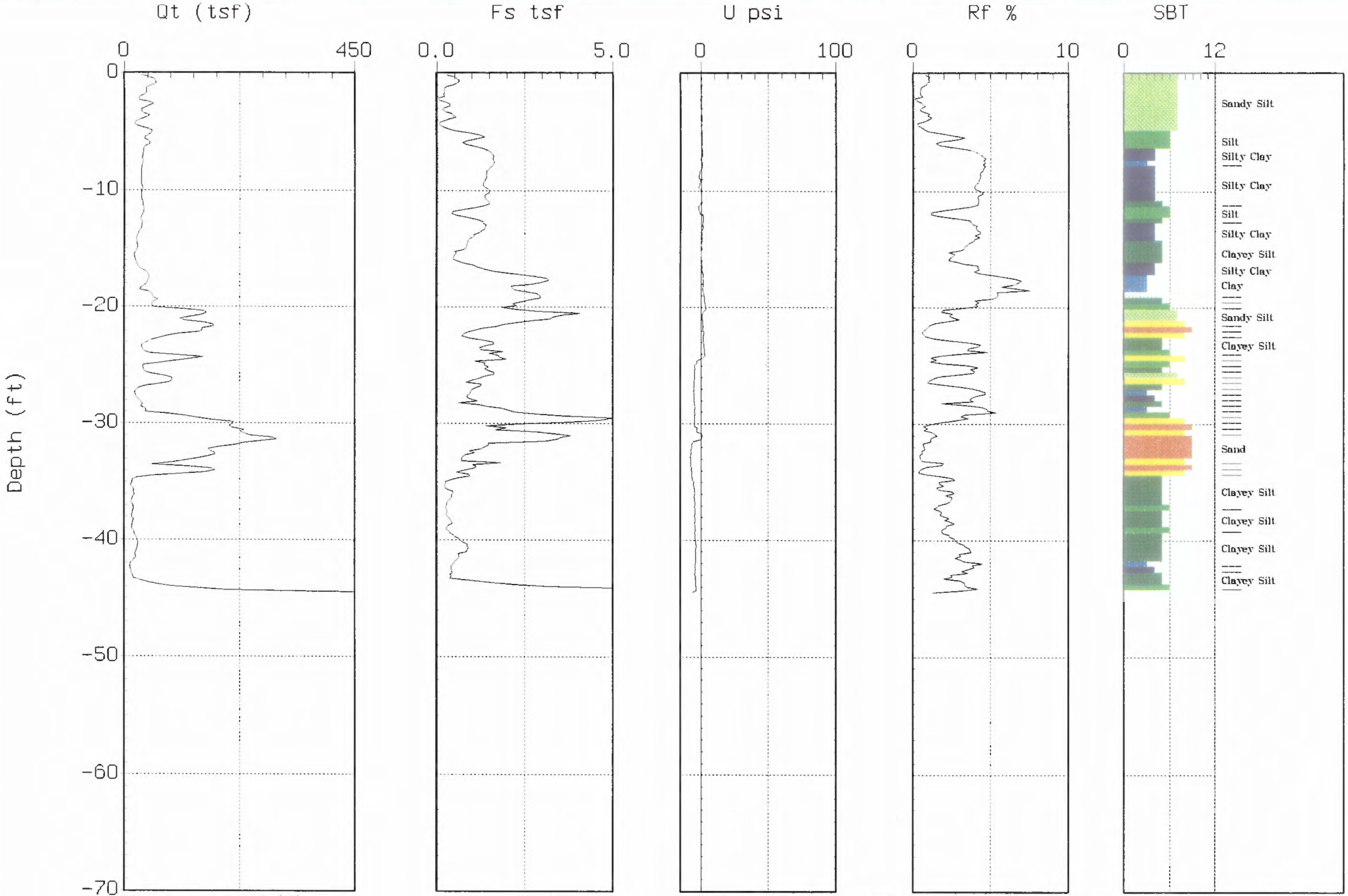
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #470
Location : 470-CP-03

Geologist: Todd Miller
Date : 11:03:98 12:50



Max. Depth: 44.45 (ft)

Depth Inc.: 0.164 (ft)

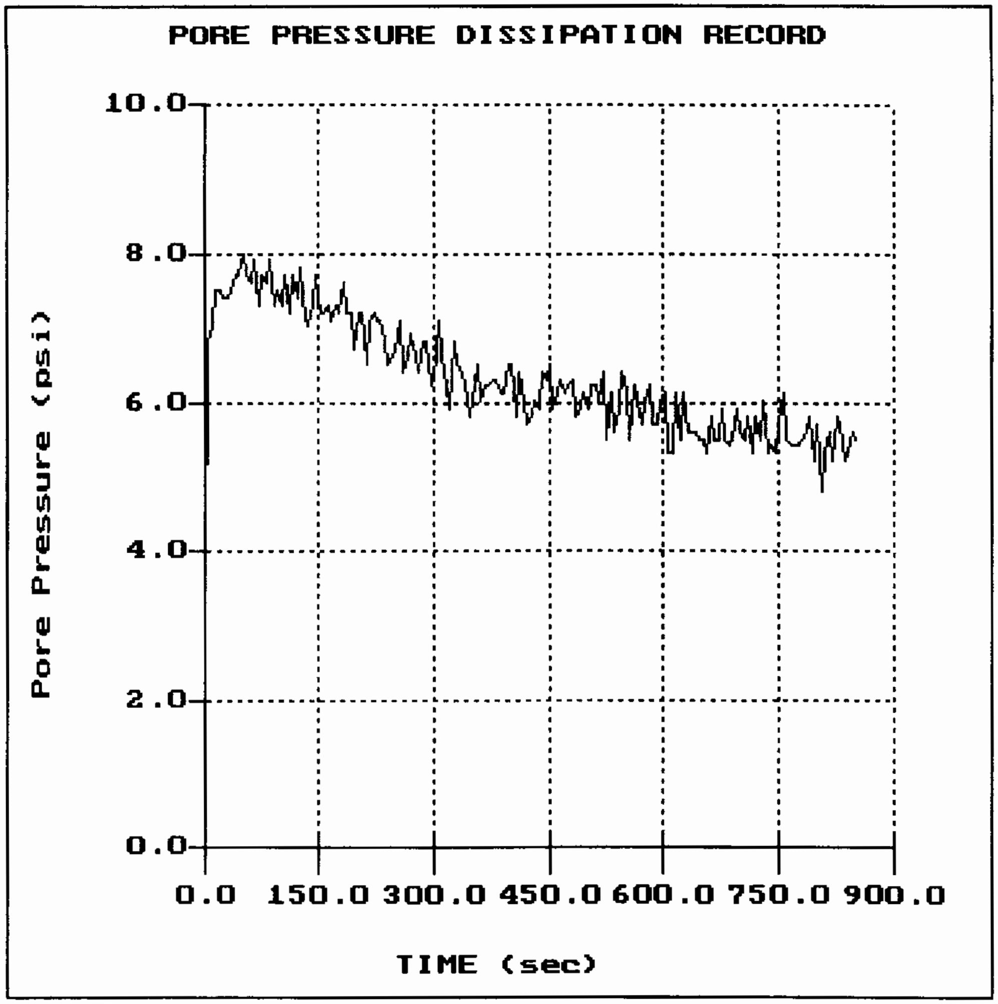
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:470-CP-01
Location:#470

Cone:20 TON AD071
Date:11:03:98 09:57

File: 108C04.PPR
Depth (m): 6.75
(ft): 22.15
Duration : 850.0s

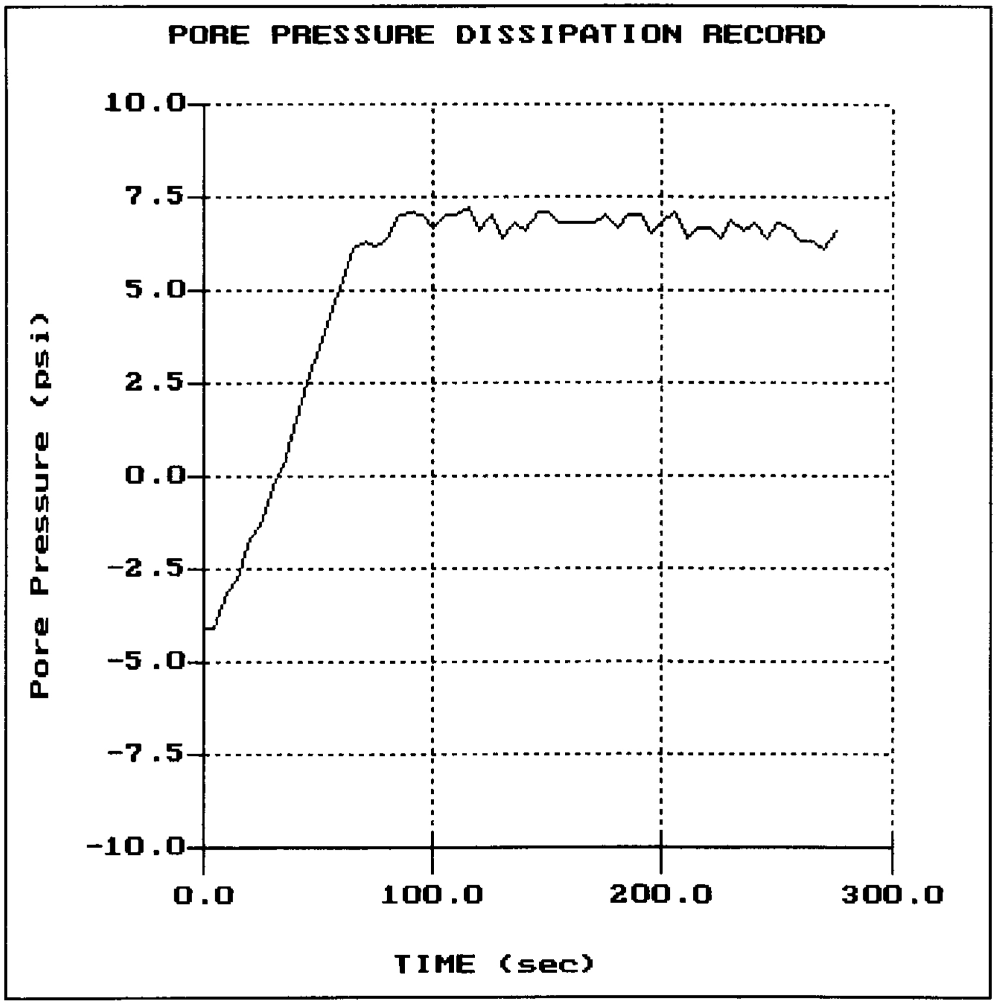


LFR LEVINE FRICKE

Hole:470-CP-01
Location:#470

Cone:20 TON AD071
Date:11:03:98 09:57

File: 108C04.PPR
Depth (m): 7.50
(ft): 24.61
Duration : 275.0s

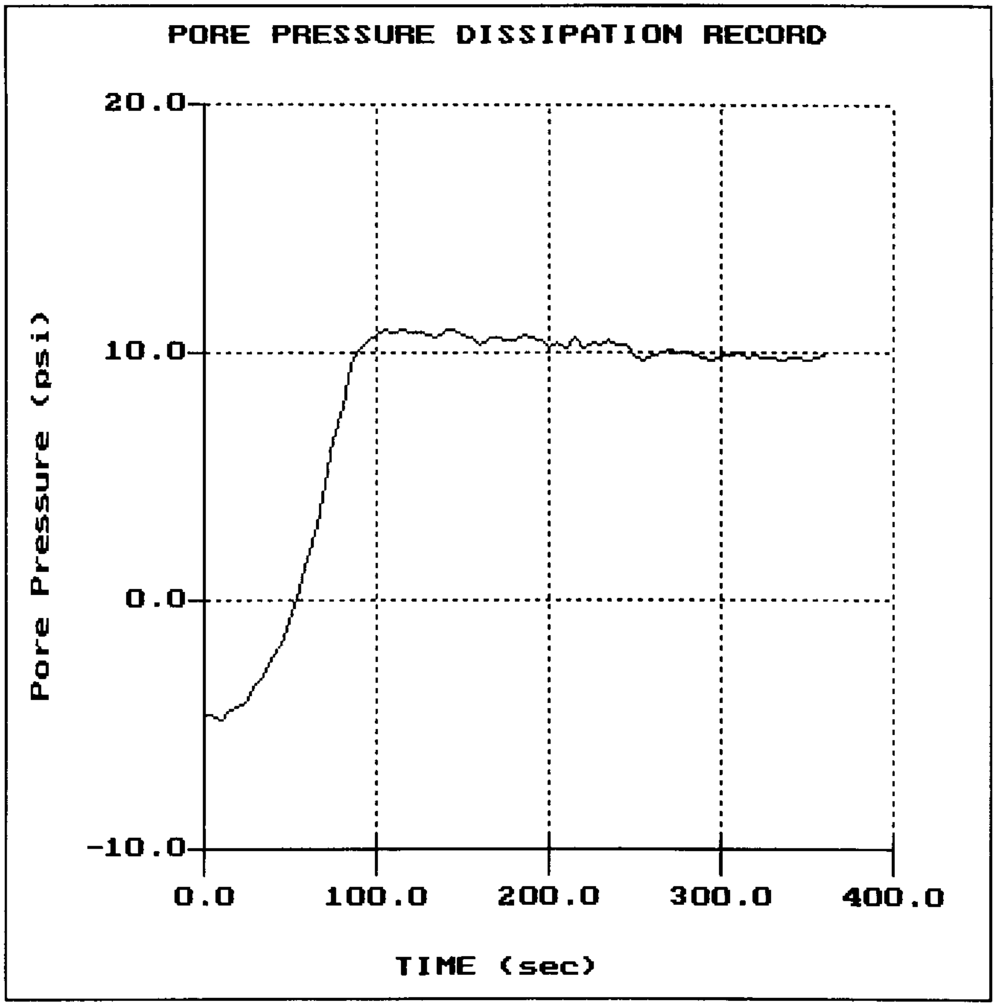


LFR LEVINE FRICKE

Hole:470-CP-01
Location:#470

Cone:20 TON AD071
Date:11:03:98 09:57

File: 108C04.PPR
Depth (m): 9.95
(ft): 32.64
Duration : 360.0s

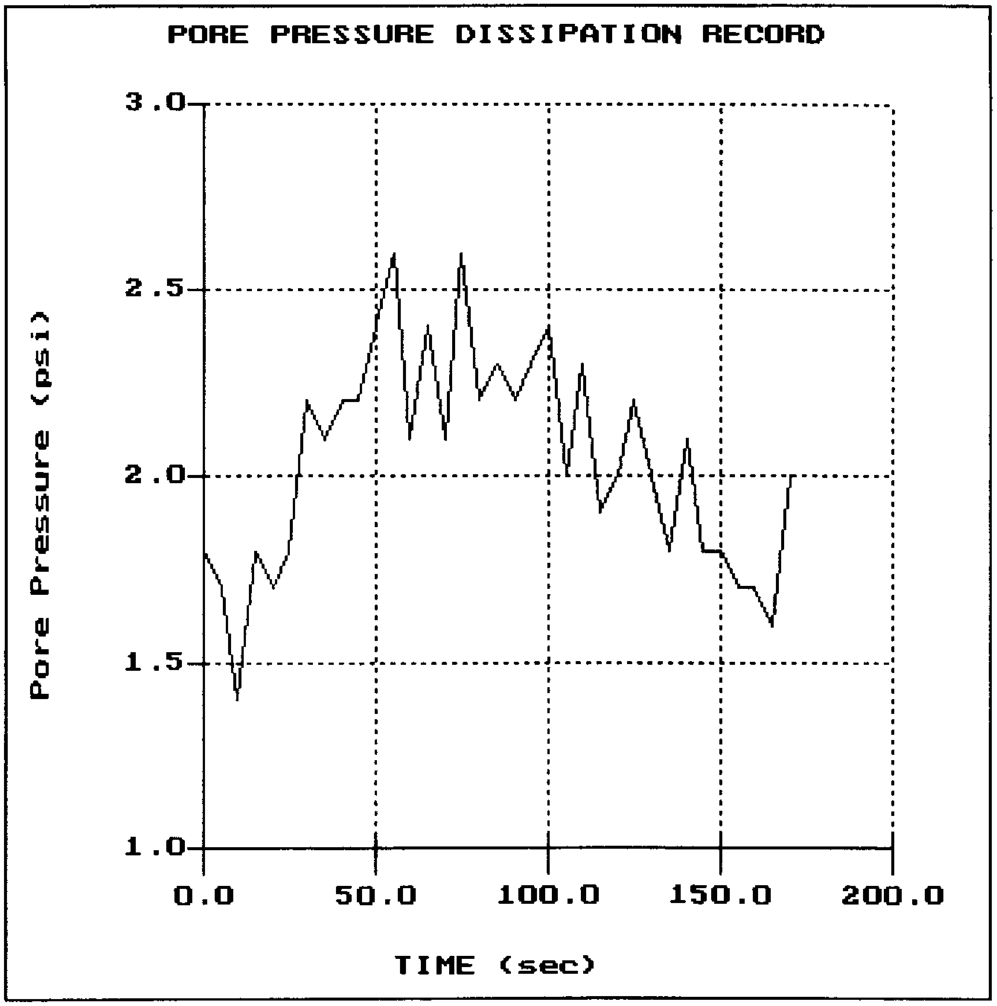


LFR LEVINE FRICKE

Hole:470-CP-03
Location:#470

Cone:20 TON AD071
Date:11:03:98 12:50

File: 108C06.PPR
Depth (m): 6.70
(ft): 21.98
Duration : 170.0s

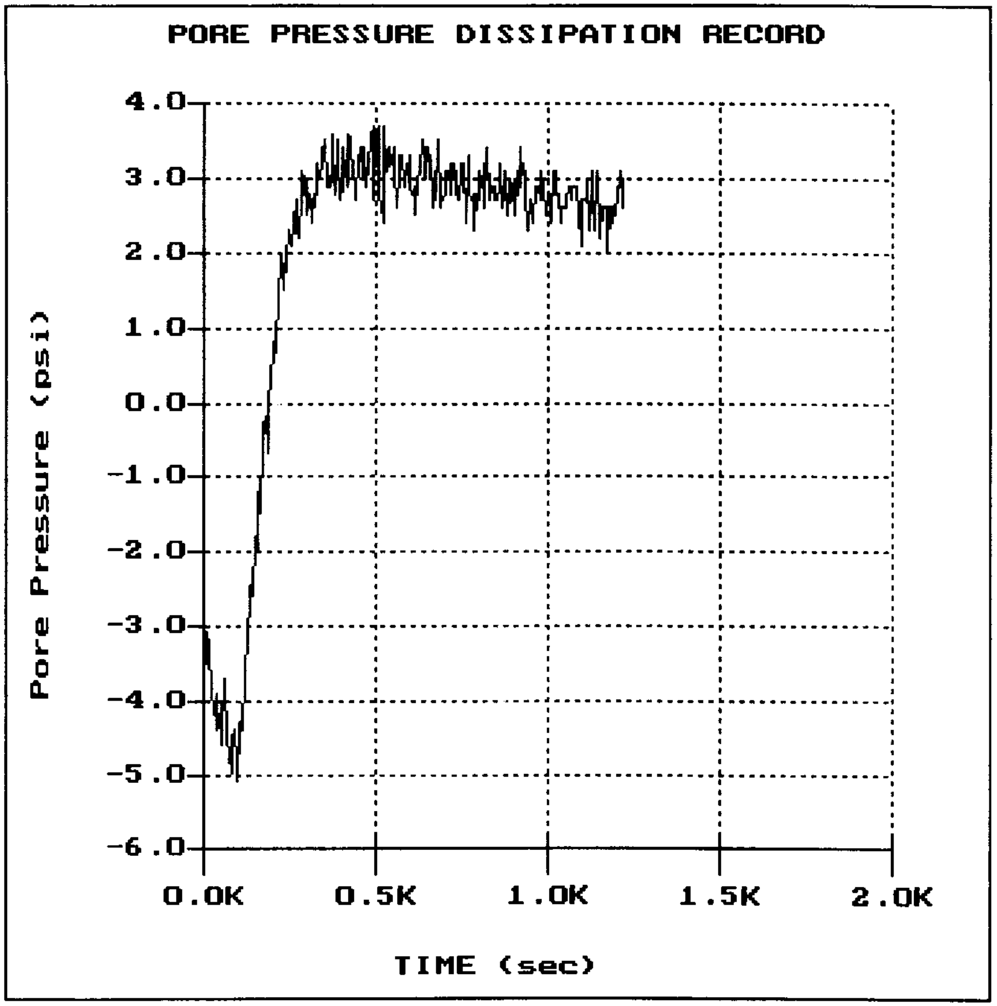


LFR LEVINE FRICKE

Hole:470-CP-03
Location:#470

Cone:20 TON AD071
Date:11:03:98 12:50

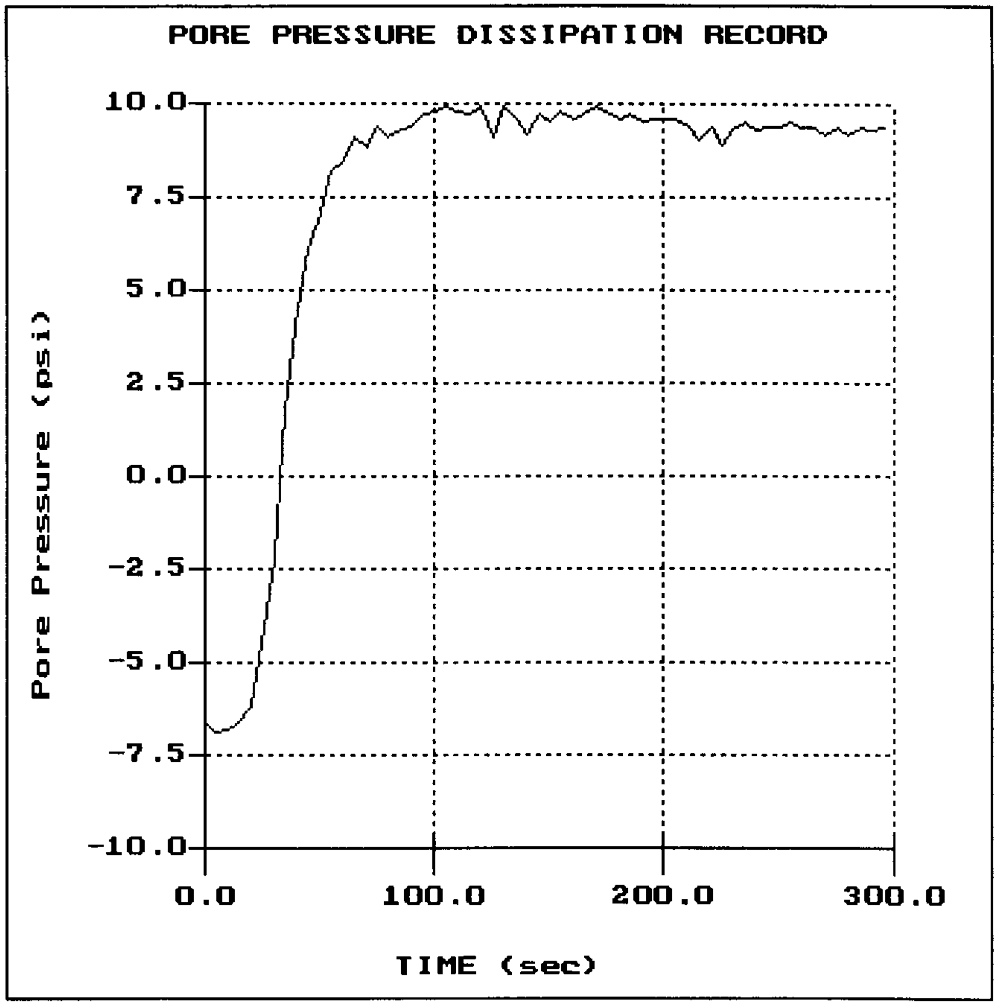
File: 108C06.PPR
Depth (m): 9.35
(ft): 30.68
Duration : 1220.0s



LFR LEVINE FRICKE

Hole:470-CP-03
Location:#470

Cone:20 TON AD071
Date:11:03:98 12:5

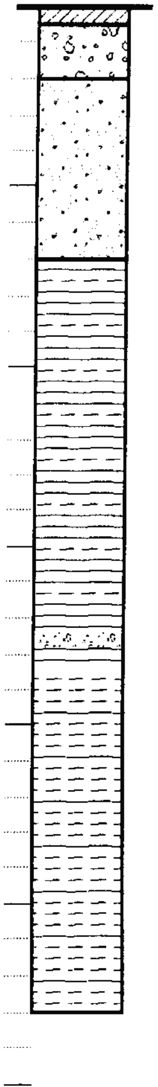


File: 108C06.PPR
Depth (m): 13.55
(ft): 44.46
Duration : 295.0s

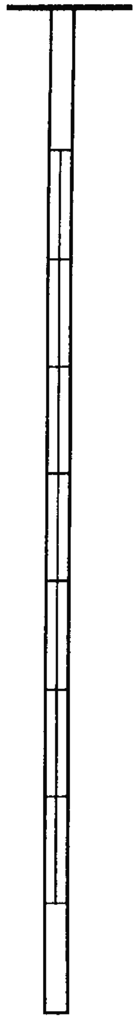
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
		0.1	SANDY GRAVEL (Engineered Fill).
			GRAVELLY SAND (SW), dark brown, slightly moist, loose, coarse sand.
5		0.1	
		No recovery	
			SILTY CLAY to CLAYEY SILT (CL-ML), dark yellowish brown, slightly moist, stiff, medium plasticity, some fine sand.
10		0.0	
		0.0	Very stiff.
15		0.0	
			Thin gravel interbeds, coarse rounded gravel in silty clay matrix.
20		0.0	
			No recovery, suspect gravels in softer matrix.
25			
		No recovery	
		0.0	BOTTOM OF BORING AT 28 FEET.
30			
35			

Graphic Log



Sample Interval



JENIFER J. BEATTY No. 6650 Exp. 4/30/01

EXPLANATION

▤	Clay
☷	Silt
░	Sand
▒	Gravel

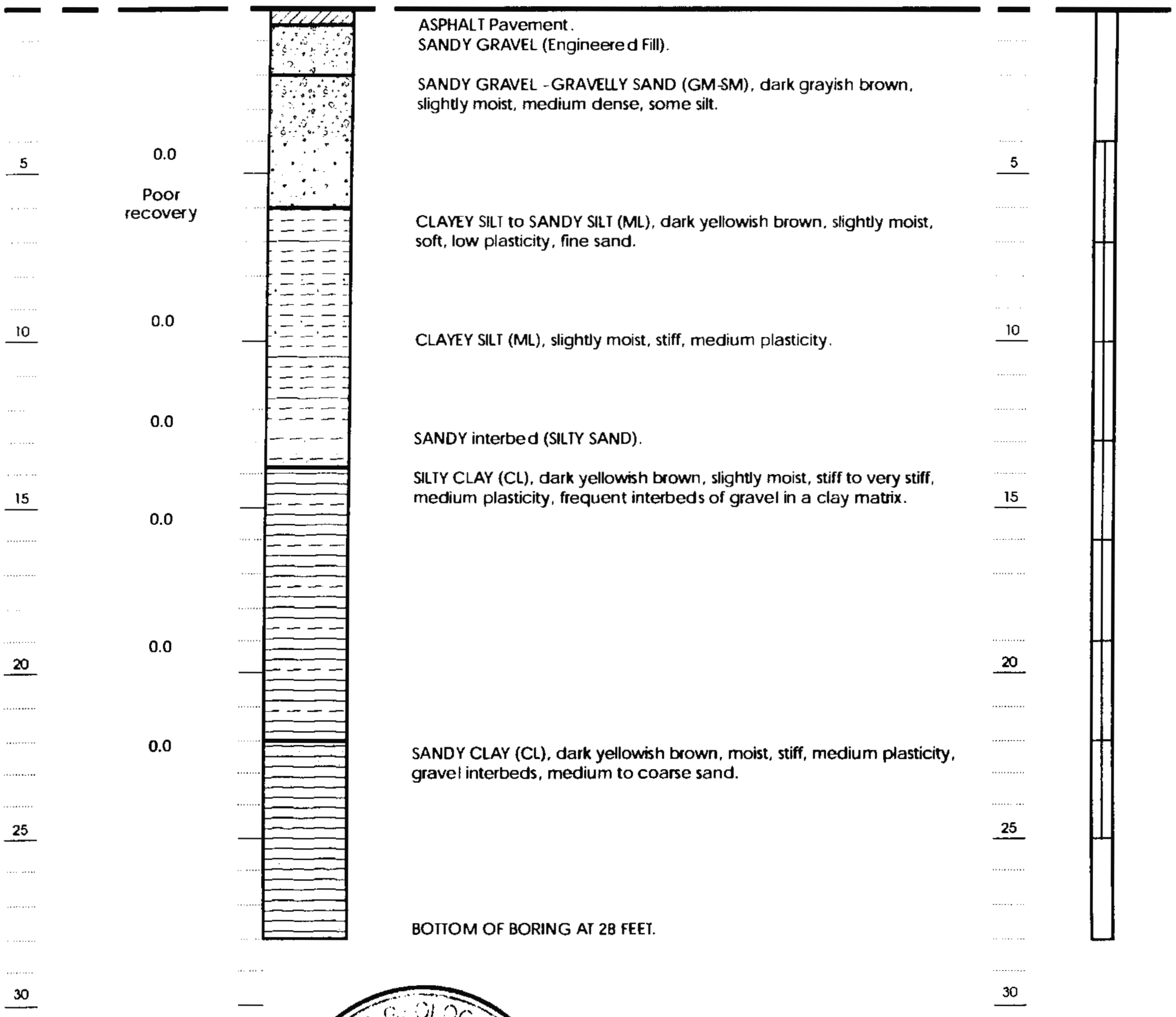
PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 18, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LITHOLOGY FOR 470-BH-01 *(page 1 of 1)*

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Depth, feet
			ASPHALT Pavement.	
			SANDY GRAVEL (Engineered Fill).	
			SANDY GRAVEL - GRAVELLY SAND (GM-SM), dark grayish brown, slightly moist, medium dense, some silt.	
5		0.0		5
		Poor recovery		
			CLAYEY SILT to SANDY SILT (ML), dark yellowish brown, slightly moist, soft, low plasticity, fine sand.	
10		0.0	CLAYEY SILT (ML), slightly moist, stiff, medium plasticity.	10
		0.0	SANDY interbed (SILTY SAND).	
			SILTY CLAY (CL), dark yellowish brown, slightly moist, stiff to very stiff, medium plasticity, frequent interbeds of gravel in a clay matrix.	
15		0.0		15
20		0.0		20
		0.0	SANDY CLAY (CL), dark yellowish brown, moist, stiff, medium plasticity, gravel interbeds, medium to coarse sand.	
25				25
			BOTTOM OF BORING AT 28 FEET.	
30				30
35				35

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 18, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

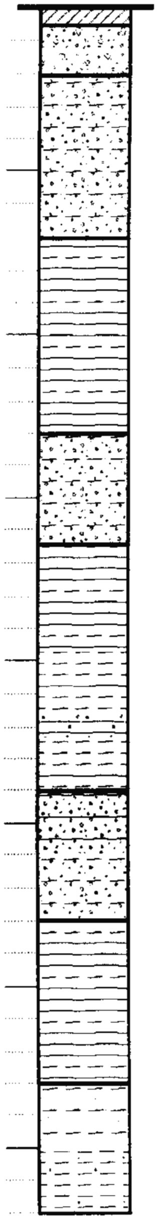
EXPLANATION

▤	Clay
☰	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

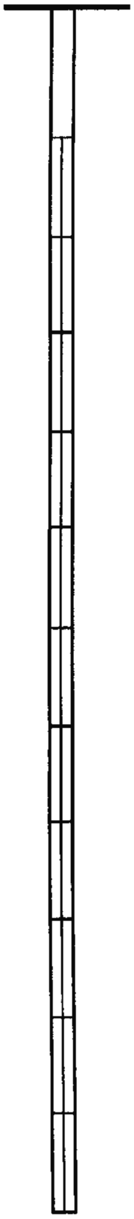
▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT pavement. SANDY GRAVEL (Engineered Fill).
			SILTY SANDY GRAVEL (GM), dark gray.
5		0.0	
		No recovery	
		0.0	
			SILTY CLAY (CL), dark brown, slightly moist, medium stiff, medium plasticity, trace fine sand.
		0.0	
10		0.0	
		0.0	
			SANDY SILTY GRAVEL (GM), yellowish brown, slightly moist, medium dense.
15		Poor recovery	
		0.0	
			SILTY CLAY to CLAYEY SILT (CL-ML), yellowish brown, slightly moist, stiff, medium plasticity.
		0.0	
20			
			Frequent interbeds of gravel in clay matrix.
		0.0	
			CLAYEY GRAVEL (GC) to SILTY GRAVEL (GM), yellowish brown to dark brown, slightly moist to moist, dense.
25		0.0	
			SILTY CLAY (CL), yellowish brown, moist, stiff, medium plasticity, some fine sand.
		0.0	
30			
		0.0	
			SILTY SAND to SANDY SILT (ML), moist.
35		0.0	
			BOTTOM OF BORING AT 37 FEET.
40			

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 17, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

J. BEATTY
No. 6650
Exp. 4/30/01

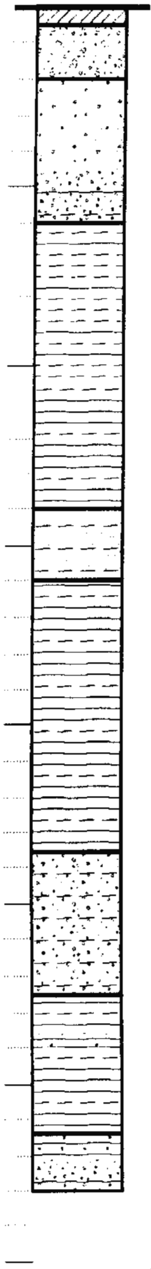
EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

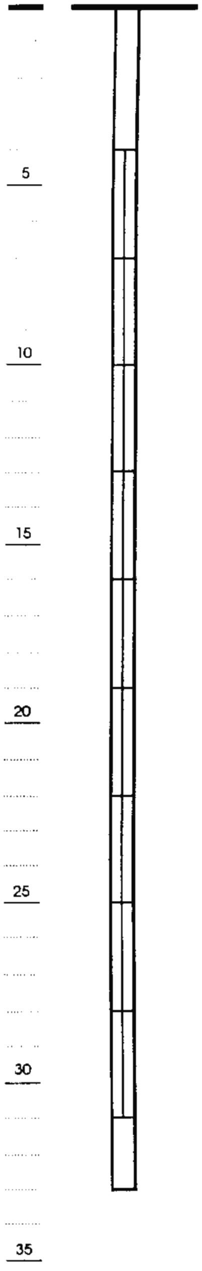
▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement. SANDY GRAVEL (Engineered Fill).
			GRAVELLY SAND (SW), dark brown, slightly moist, medium dense, some silt.
5		No recovery	SILTY CLAYEY GRAVEL (GM-GC).
		0.0	CLAYEY SILT to SILTY CLAY (ML-CL), dark yellowish brown, slightly moist, stiff, medium plasticity, some and gravel.
10		0.0	Increased sand.
		0.0	
15		Poor recovery	SILTY SAND (SM), dark brown, slightly moist, loose.
		0.0	SILTY CLAY (CL), dark yellowish brown, slightly moist, stiff, medium plasticity, gravelly interbeds.
			Softer, moist sandy interbed?
		0.0	
20			Soft, moist sandy interbed.
		0.0	
			SILTY GRAVEL (GM), dark grayish brown, slightly moist, dense.
25		0.0	
			SILTY CLAY (CL), dark yellowish brown, moist, stiff, medium plasticity, some interbedded gravel.
30			
			GRAVELLY CLAY to CLAYEY GRAVEL (CL-GC), dark grayish brown, slightly moist, dense.
			BOTTOM OF BORING AT 33 FEET.
35			

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 18, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

No. 6650
Exp.

EXPLANATION

▤ Clay
┅ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

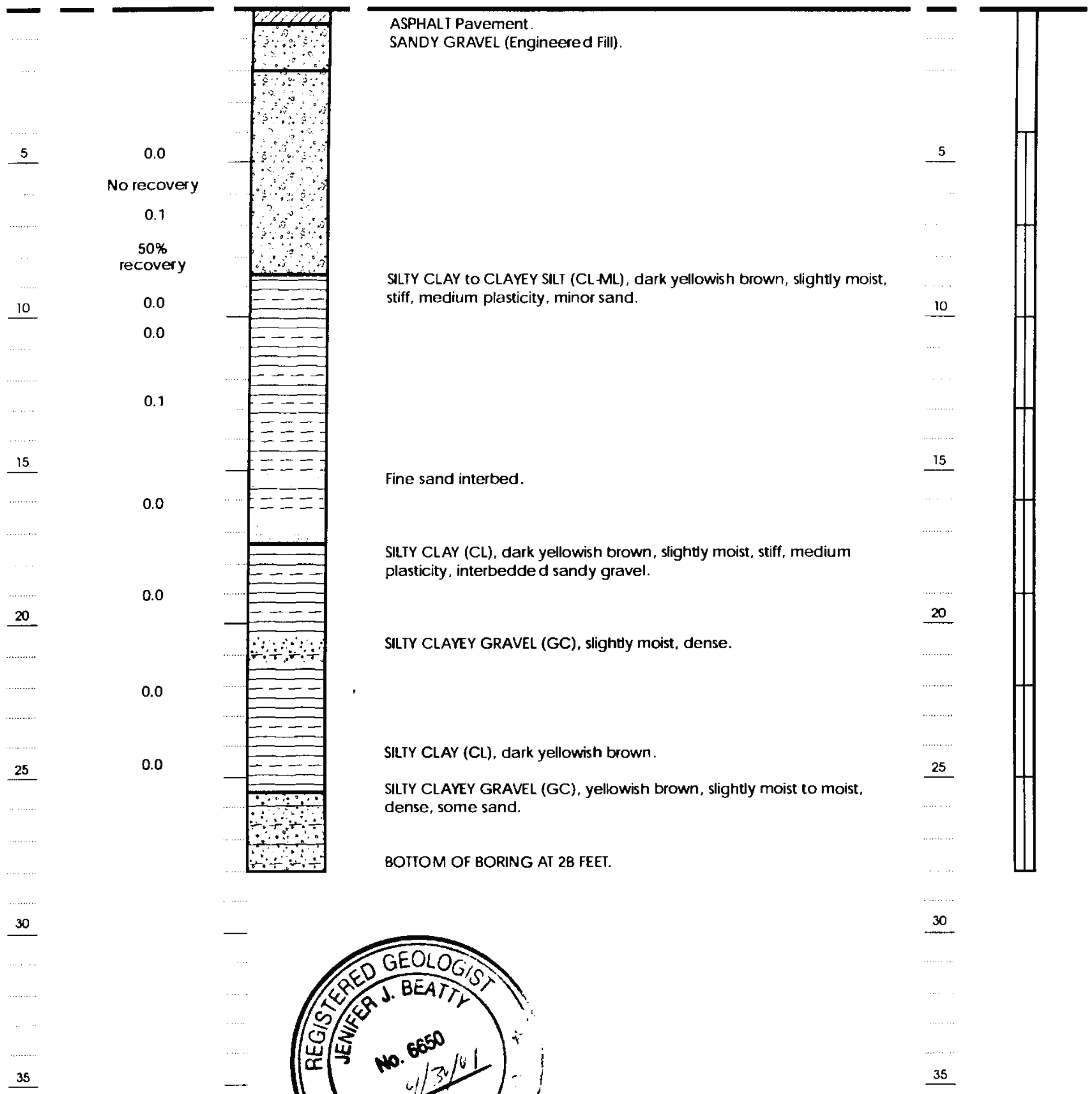
LFR
LEVINE•FRICKE

LITHOLOGY FOR 470-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



PID Reading (ppm):
0.0
No recovery
0.1
50% recovery
0.0
0.0
0.1
0.0
0.0
0.0
0.0

ASPHALT Pavement.
SANDY GRAVEL (Engineered Fill).

SILTY CLAY to CLAYEY SILT (CL-ML), dark yellowish brown, slightly moist, stiff, medium plasticity, minor sand.

Fine sand interbed.

SILTY CLAY (CL), dark yellowish brown, slightly moist, stiff, medium plasticity, interbedded sandy gravel.

SILTY CLAYEY GRAVEL (GC), slightly moist, dense.

SILTY CLAY (CL), dark yellowish brown.

SILTY CLAYEY GRAVEL (GC), yellowish brown, slightly moist to moist, dense, some sand.

BOTTOM OF BORING AT 28 FEET.

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	November 19, 1998
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

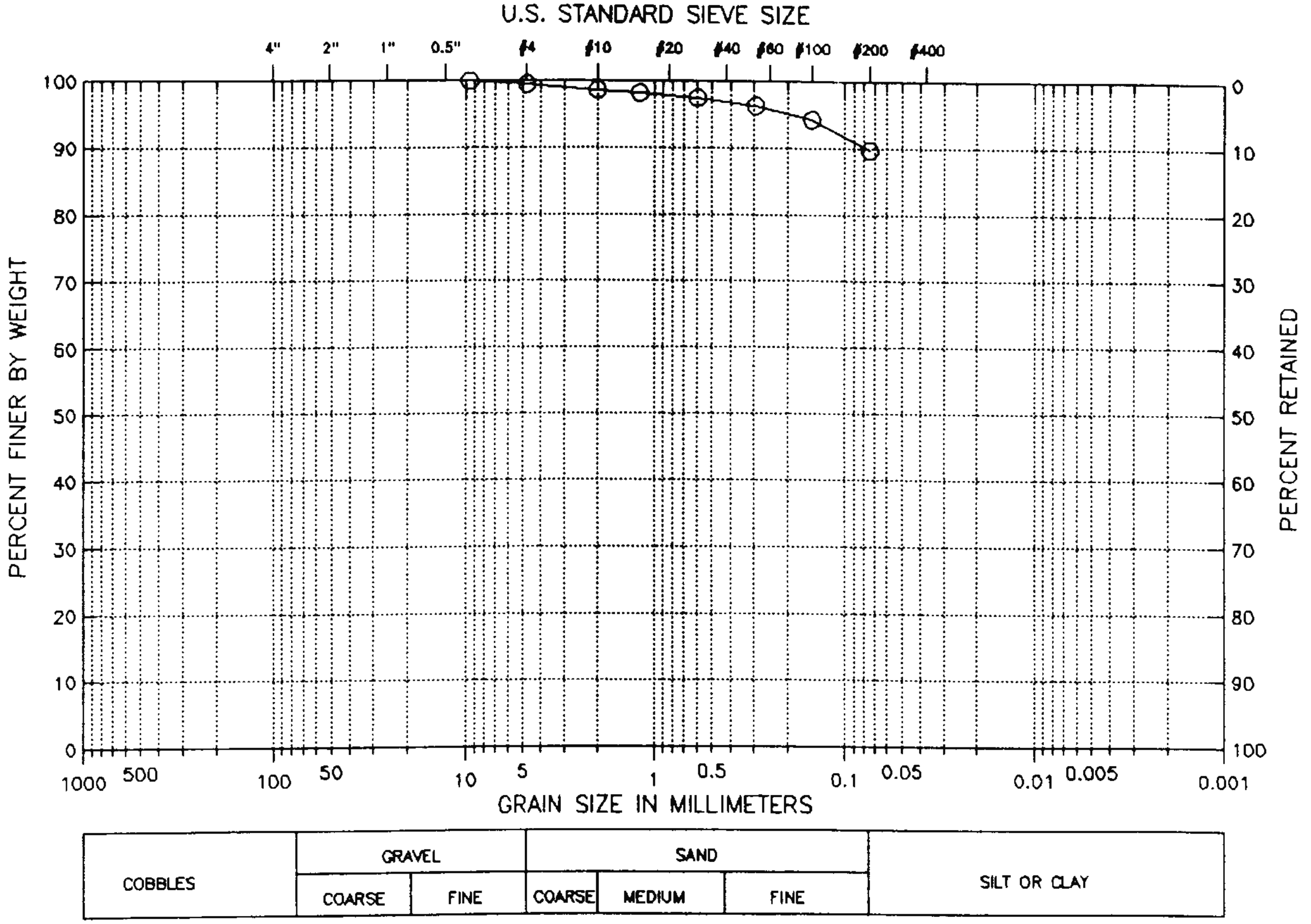
EXPLANATION
▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Boring No. : 470-BH-01
Sample No.: 8
Tested by : J. HEBEL
Filename : 470-08

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Classification :

Visual Description :
BROWN SILTY CLAY

Remarks :
Depth: 7.5–8.0 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 23 12:40:14 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 470-08
Project No. : 16148A	Depth : 8.0 FT.	Elevation : NA
Boring No. : 470-BH-01	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 8	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN SILTY CLAY

Remarks : Depth: 7.5-8.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	0.93	0.93	100
#10	0.079	2.00	1.59	2.52	99
#16	0.047	1.19	0.79	3.31	98
#30	0.023	0.60	1.36	4.67	98
#50	0.012	0.30	2.18	6.85	96
#100	0.006	0.15	4.01	10.86	94
#200	0.003	0.07	8.65	19.51	90

Total Dry Weight of Sample = 191.3

D85 : N/A
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

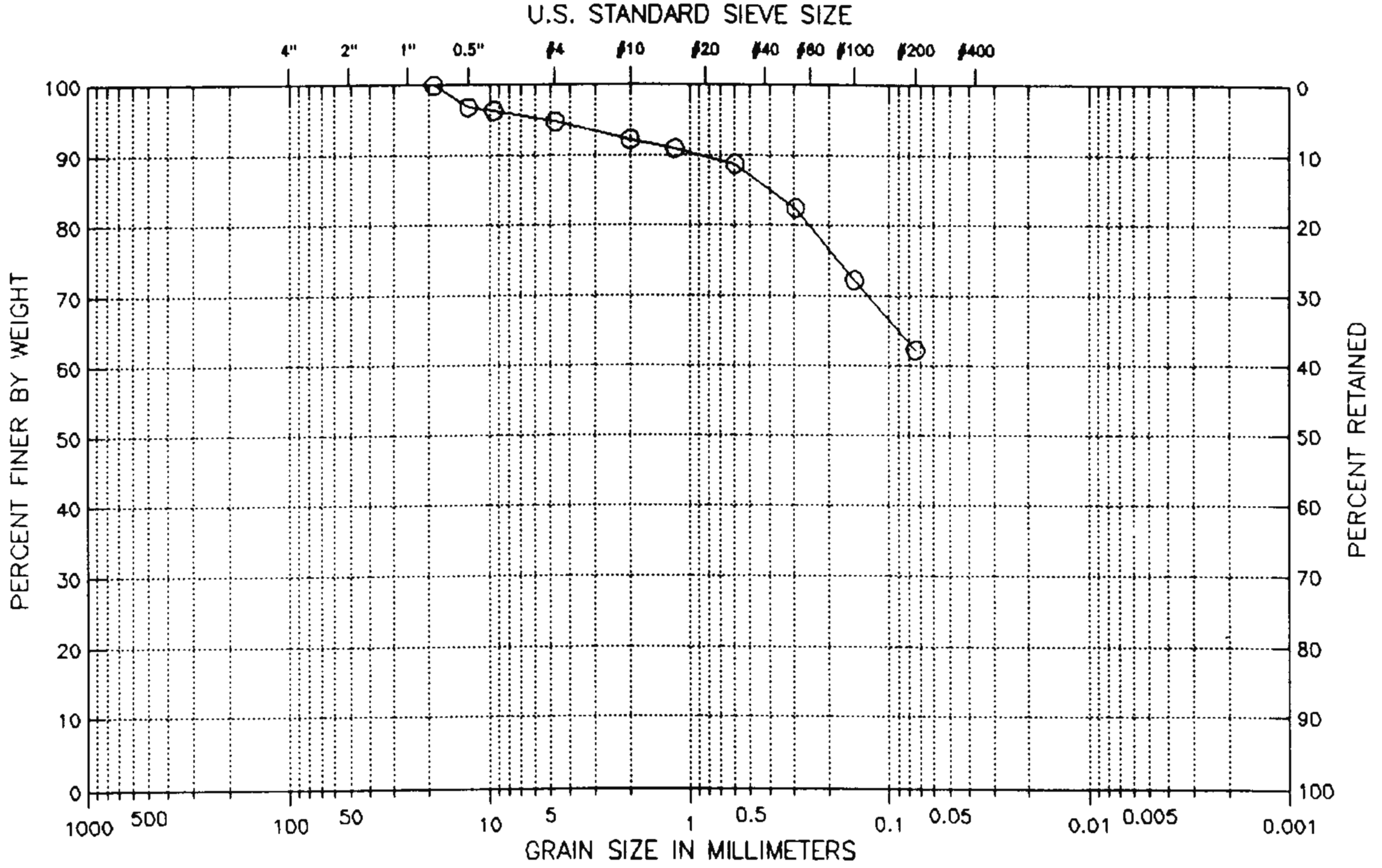
Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

```
Wed Dec 23 12:40:14 1998                                                         Page :  2

                               GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                    Filename : 470-08
Project No. : 16148A           Depth : 8.0 FT.                Elevation : NA
Boring No. : 470-BH-01         Test Date : 12/23/98           Tested by : J. HEBEL
Sample No. : 8                 Test Method : ASTM D422        Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN SILTY CLAY
Remarks : Depth:  7.5-8.0 feet

                                  Natural Moisture Content
  Moisture Content   Mass of Container  Mass of Container  Mass of Container  Moisture Content
  ID                                    and Moist Soil     and Dried Soil
                           (gm)               (gm)               (gm)               (%)
  -----------------  -----------------  -----------------  -----------------  -----------------
1) 470-08                      218.70             446.30             410.00              18.98

     Average Moisture Content = 18.98
```

Boring No. : 470-BH-01
Sample No.: 25
Tested by : J. HEBEL
Filename : 470-25

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN SA-SI CLAY WITH GRAVEL AND CARBON NODULES

Remarks :
Depth: 24-25 feet

Figure 2

URS Greiner Woodward Clyde

Wed Dec 23 12:40:26 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 470-25
Project No. : 16148A	Depth : 24-25 FT.	Elevation : NA
Boring No. : 470-BH-01	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 25	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN SA-SI CLAY WITH GRAVEL AND CARBON NODULES

Remarks : Depth: 24-25 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	8.07	8.07	97
0.375"	0.374	9.51	1.41	9.48	96
#4	0.187	4.75	3.93	13.41	95
#10	0.079	2.00	6.54	19.95	92
#16	0.047	1.19	3.32	23.27	91
#30	0.023	0.60	5.83	29.10	89
#50	0.012	0.30	16.31	45.41	82
#100	0.006	0.15	26.21	71.62	72
#200	0.003	0.07	25.90	97.52	62

Total Dry Weight of Sample = 258.7

D85 : 0.3919 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

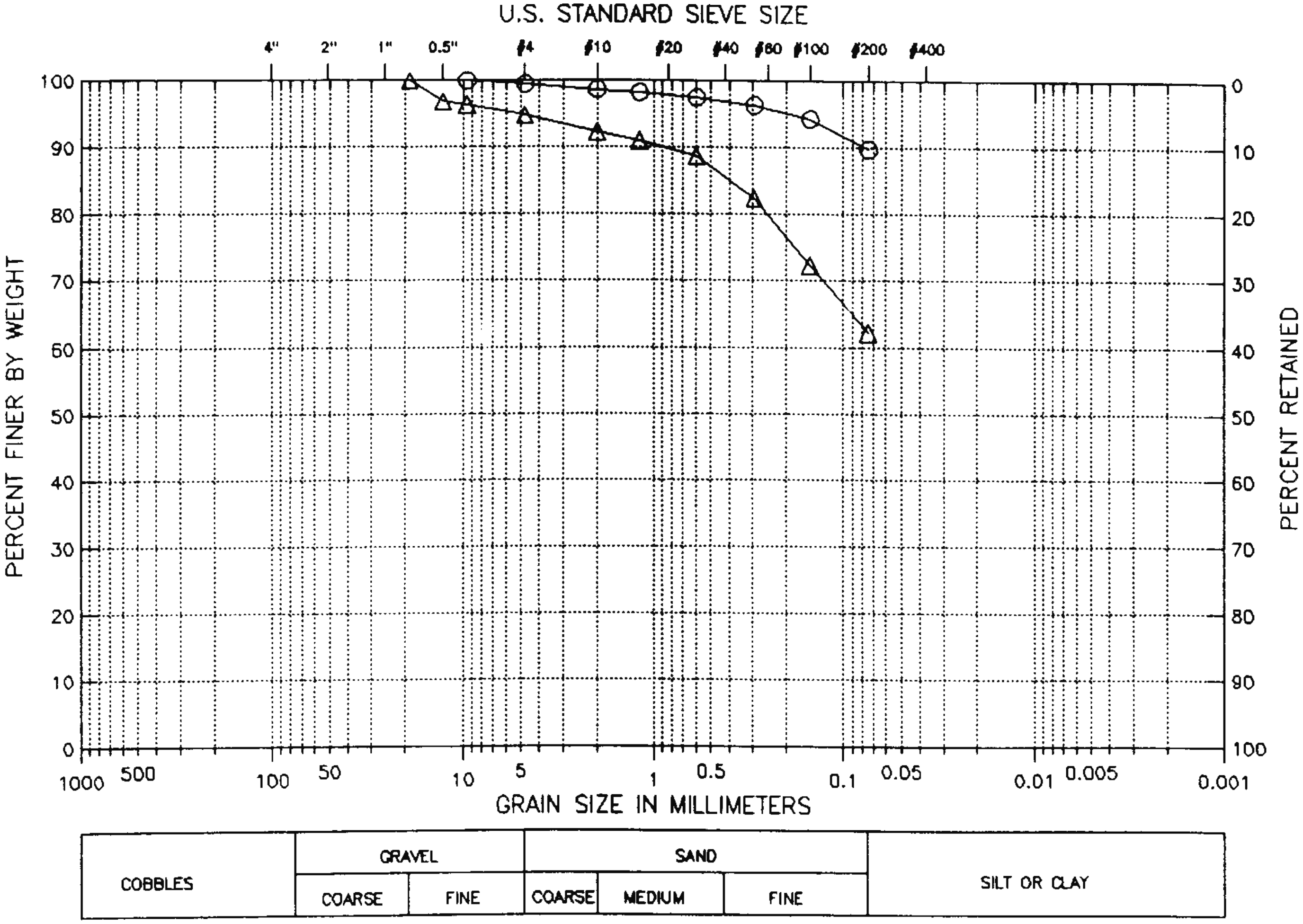
Project : LEVINE FRICKE RECON 6730.00-024
Filename : 470-25
Project No. : 16148A
Depth : 24-25 FT.
Elevation : NA
Boring No. : 470-BH-01
Test Date : 12/23/98
Tested by : J. HEBEL
Sample No. : 25
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SA-SI CLAY WITH GRAVEL AND CARBON NODULES
Remarks : Depth: 24-25 feet

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 470-25	192.40	496.60	451.10	17.59

Average Moisture Content = 17.59

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
-○-	470-BH-01	8	8.0 FT.	470-08	BROWN SILTY CLAY
-△-	470-BH-01	25	24-25 FT.	470-25	BROWN SA-SI CLAY WITH GRAVEL AND CARBON NODULES

Figure 1

URS Greiner Woodward Clyde

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 489

RAT Petroleum
17005 Condit Road
Morgan Hill, California 95037

May 7, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Santa Clara County Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Soil borings were drilled adjacent to the site to depths of approximately 40 to 45 feet below ground surface (bgs). Site geology consists primarily of sandy and gravelly clays with some clayey gravels and clayey sands. The shallowest depth to groundwater measured was approximately 42 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 8,000-gallon double-walled gasoline USTs constructed of fiberglass, and fiberglass piping. The UST system utilizes mechanical line leak detection, line tightness testing and continuous interstitial monitoring for piping leak detection, and manual inventory reconciliation, automatic tank gauging, and continuous interstitial monitoring for the UST leak detection. Field observations indicate the UST system utilizes a vapor assisted vapor recovery system.

RESULTS

MtBE was detected at a concentration of 1.9 μg/l in 1 of 6 groundwater samples collected from borings drilled adjacent to this site. MtBE was not detected in any of the 16 soil samples collected. Toluene was detected in 2 of the 6 groundwater samples at concentrations of 0.52 μg/l and 0.53 μg/l. No petroleum hydrocarbons were detected in soil.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

This site was previously an Arco Station. Analytical results for a soil-gas survey apparently conducted at the site in 1991 (possibly as part of property transfer ?) indicated the presence of petroleum hydrocarbons at one soil-gas sampling location (0.12 ppm benzene, 0.3 ppm toluene, 1.1 ppm xylenes, and 7.2 ppm TPHg).

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5160-0512-RU-1

Date installed:	1991 - from form B dated 2/92
Tank capacity (gallons):	8,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Coating
Date spill containment installed:	1991 - - from Form B dated 2/92
Date overfill protection equipment installed:	1991 - - from Form B dated 2/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5160-0512-SR-1

Date installed:	1991 - from form B dated 2/92
Tank capacity (gallons):	8,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	1991 - - from Form B dated 2/92
Date overfill protection equipment installed:	1991 - - from Form B dated 2/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5160-0512-SU-1

Date installed:	1991 - from form B dated 2/92
Tank capacity (gallons):	8,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	1991 - - from Form B dated 2/92
Date overfill protection equipment installed:	1991 - - from Form B dated 2/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

T[illegible] 1
Summary of Chemical Analysis Results for Soil Samples - Site #489
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
489-BH-01	03/18/99	8.5-9.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.5-26.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		45.5-46.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
489-BH-02	03/17/99	15.0-15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		26.5-27.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
489-BH-03	03/17/99	12.5-13.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.5-22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		30.5-31.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
489-BH-04	03/16/99	15.5-16.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.5-22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		33.5-34.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
489-BH-05	03/18/99	16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		35.5-36.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		45.5-46.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 489
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
489-BH-01	03/18/99	42.0-45.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
489-BH-02	03/17/99	44.0-52.0	1.9	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
489-BH-03	03/17/99	42.0-45.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
489-BH-04	03/16/99	43.0-49.0	<0.5	<0.05	<0.5	0.53	<0.5	<0.5	<0.5	<1	<1	<1	<10
489-BH-04-DUP		43.0-49.0	<0.5	<0.05	<0.5	0.52	<0.5	<0.5	<0.5	<1	<1	<1	<10
489-BH-05	03/18/99	42.0-45.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

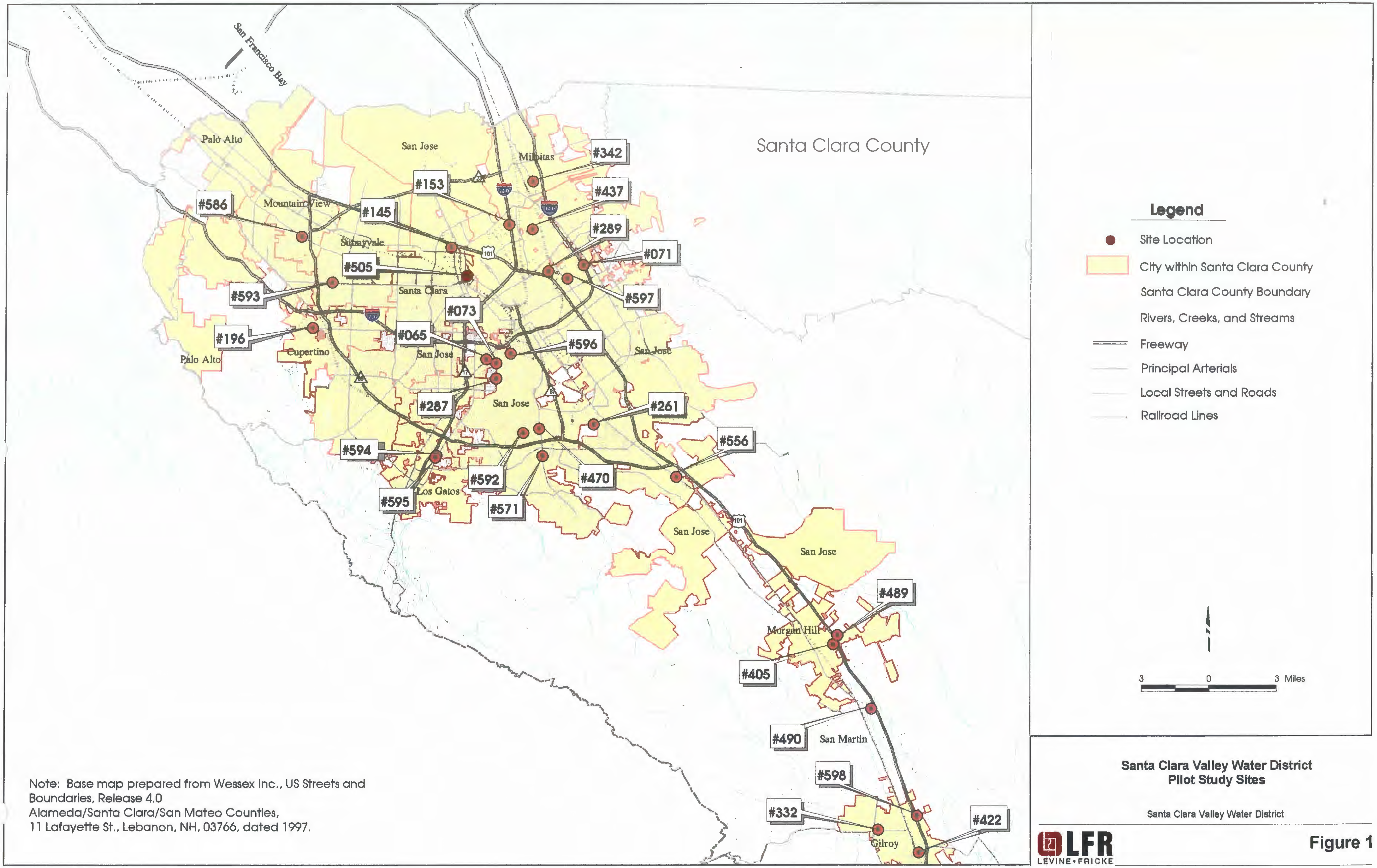
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



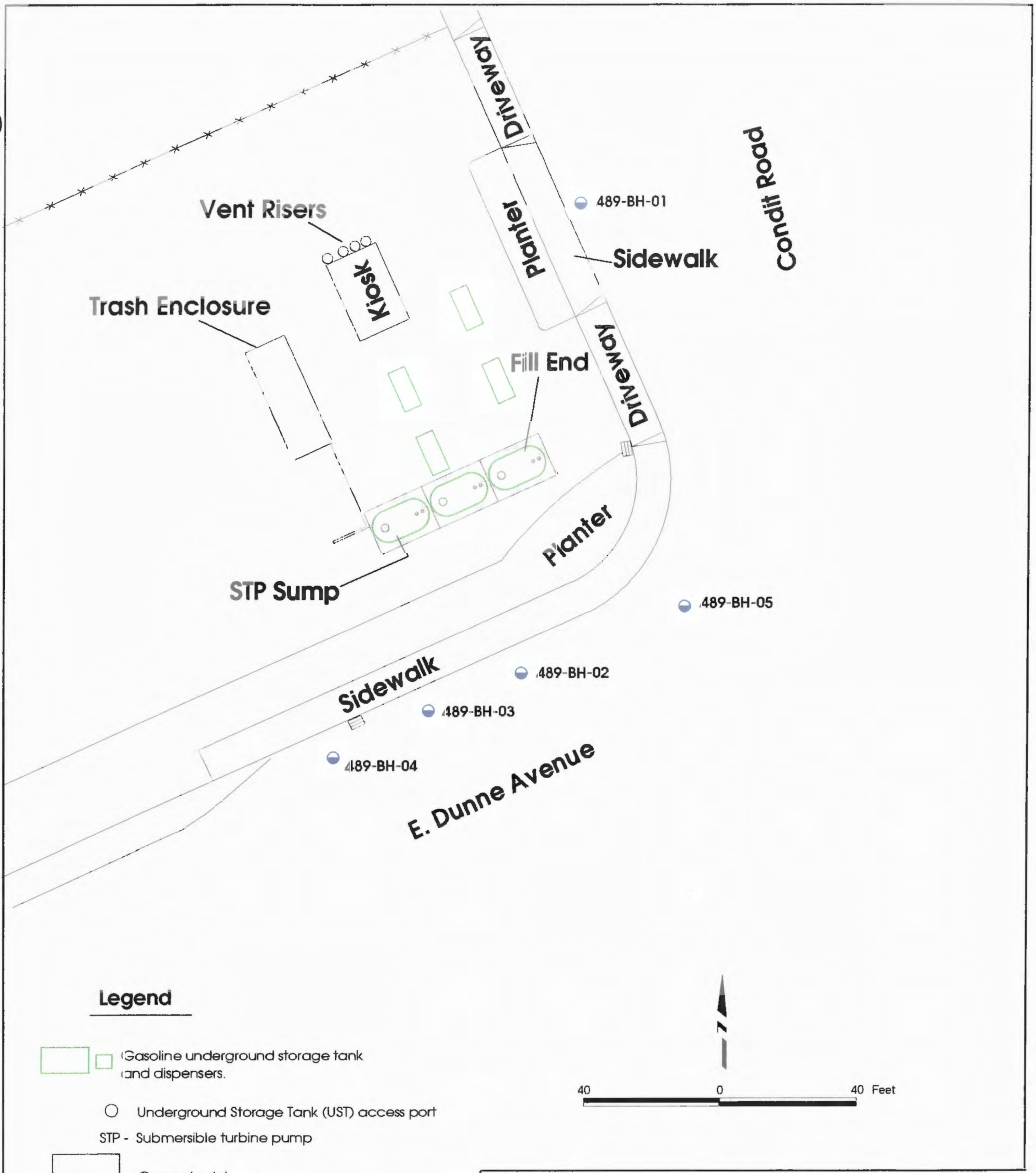
Note: Base map prepared from Wessex Inc., US Streets and
Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

🟩 Gasoline underground storage tank and dispensers.

○ Underground Storage Tank (UST) access port

STP - Submersible turbine pump

☐ Concrete slab

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

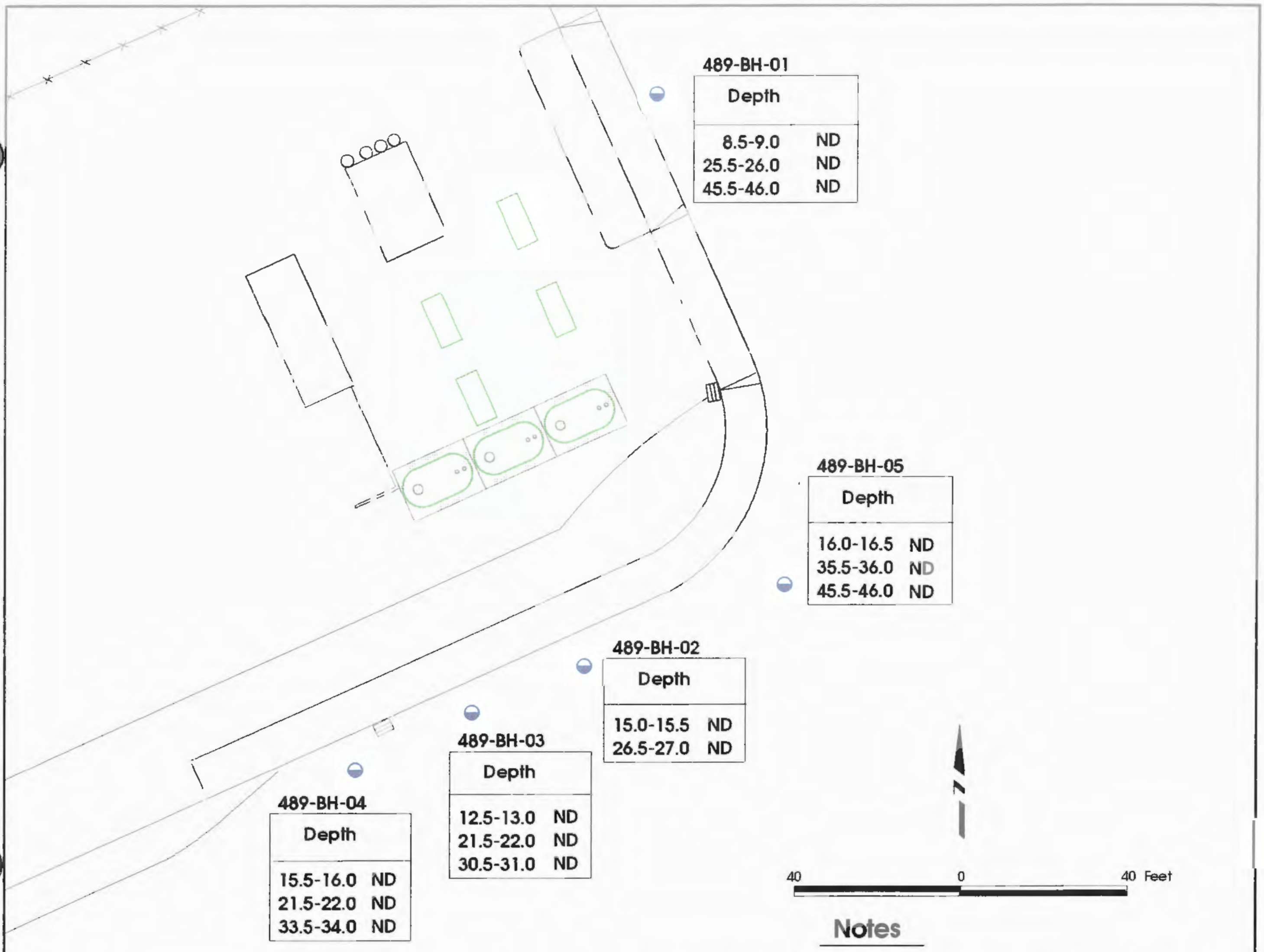
Site #489

Site Plan

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 2



489-BH-01

Depth	
8.5-9.0	ND
25.5-26.0	ND
45.5-46.0	ND

489-BH-05

Depth	
16.0-16.5	ND
35.5-36.0	ND
45.5-46.0	ND

489-BH-02

Depth	
15.0-15.5	ND
26.5-27.0	ND

489-BH-03

Depth	
12.5-13.0	ND
21.5-22.0	ND
30.5-31.0	ND

489-BH-04

Depth	
15.5-16.0	ND
21.5-22.0	ND
33.5-34.0	ND

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

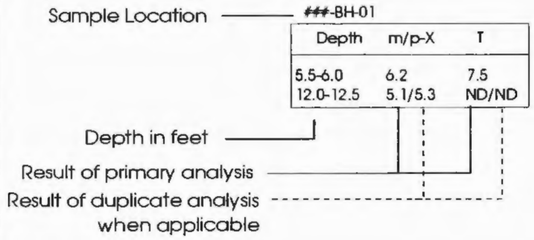
Legend

▭ ▭ Gasoline underground storage tank and dispensers.

◒ Soil and groundwater sampling location

○ Underground Storage Tank (UST) access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

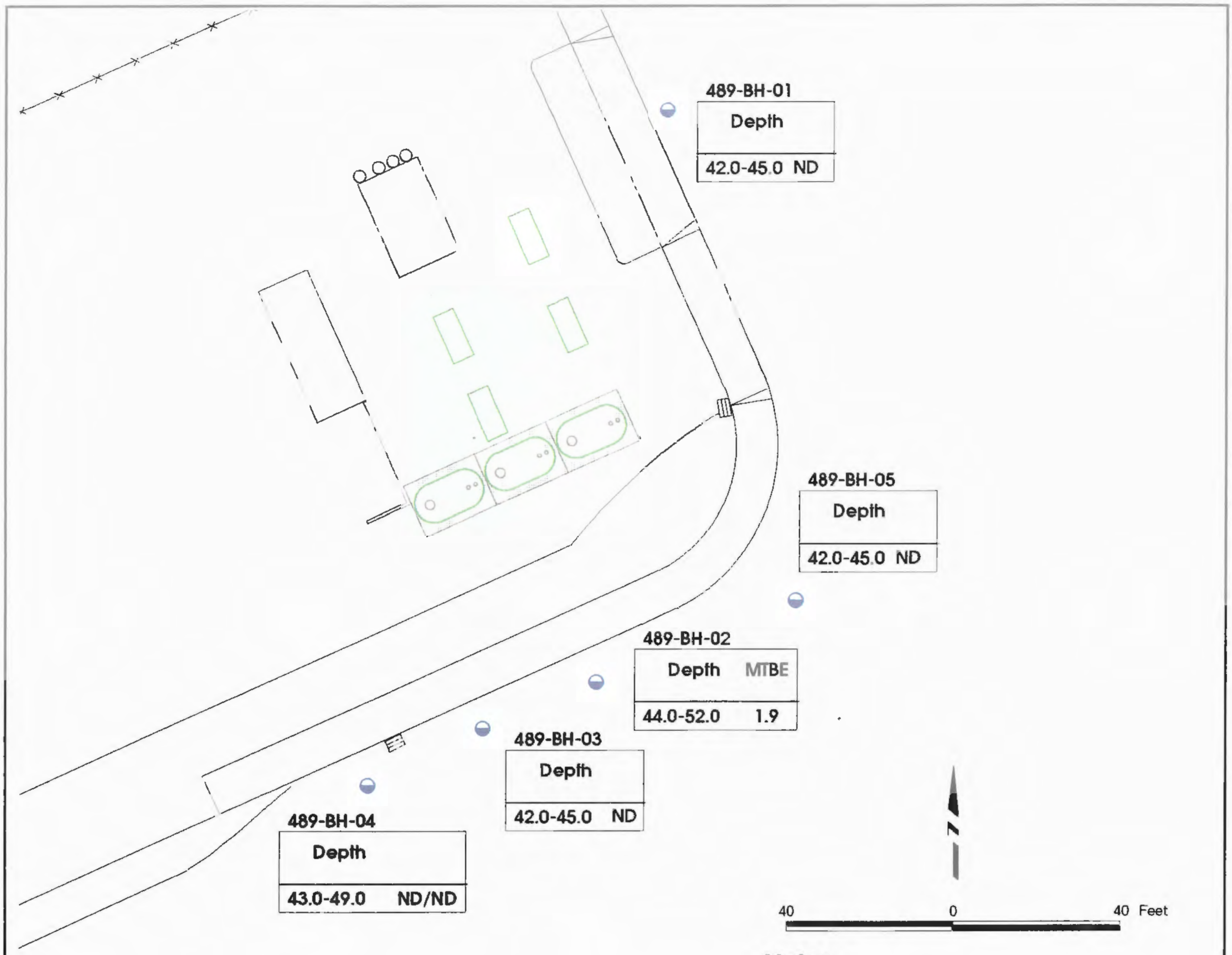
Site #489

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

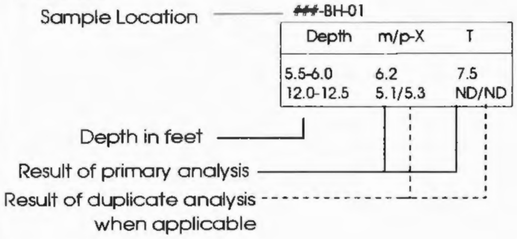
Legend

🟩 Gasoline underground storage tank and dispensers.

◒ Soil and groundwater sampling location

○ Underground Storage Tank (UST) access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

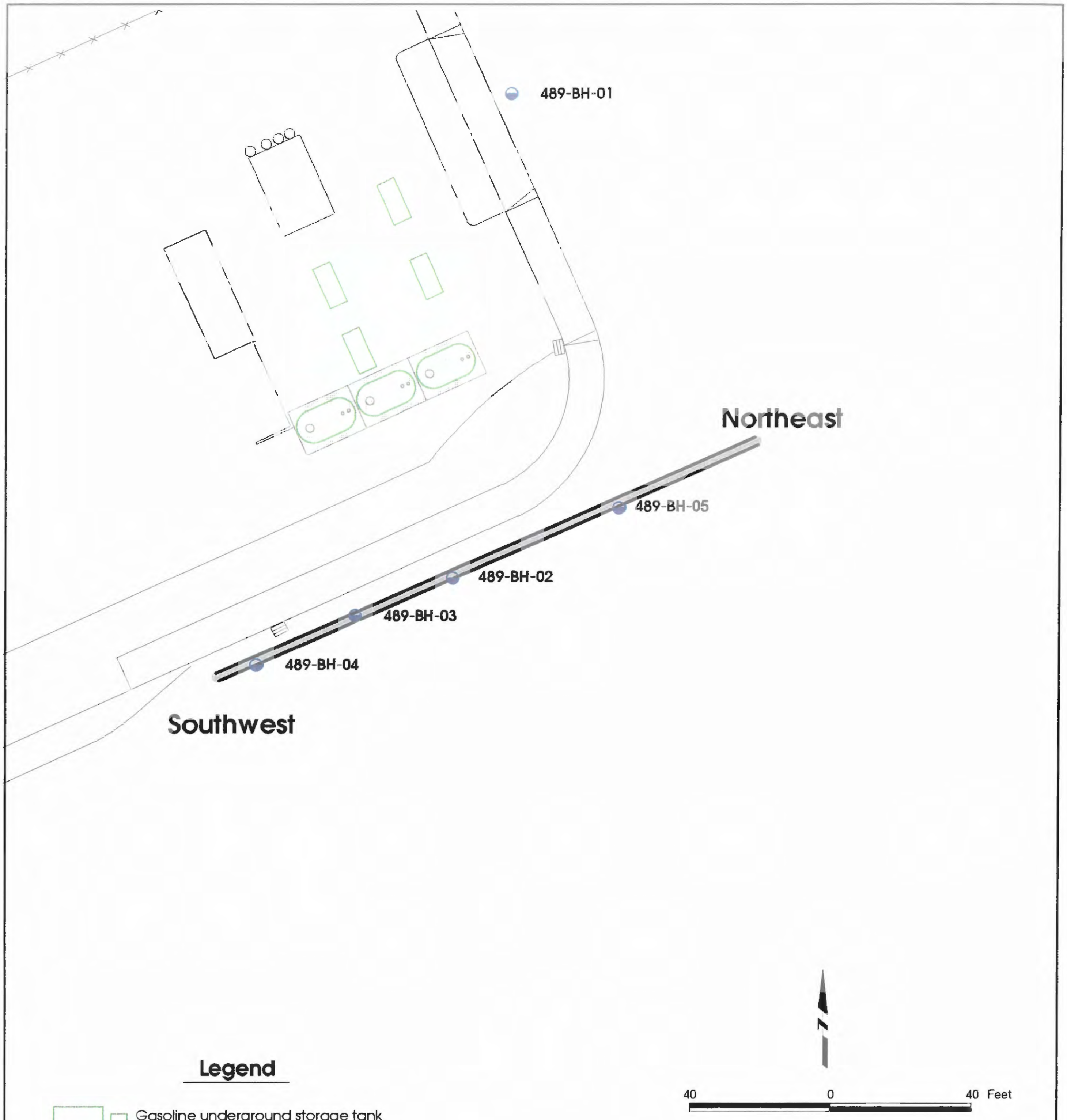
Site #489

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR LEVINE • FRICKE

Figure 4



Legend

🟩 Gasoline underground storage tank and dispensers.

● Soil and groundwater sampling location

○ Underground Storage Tank (UST) access port

☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

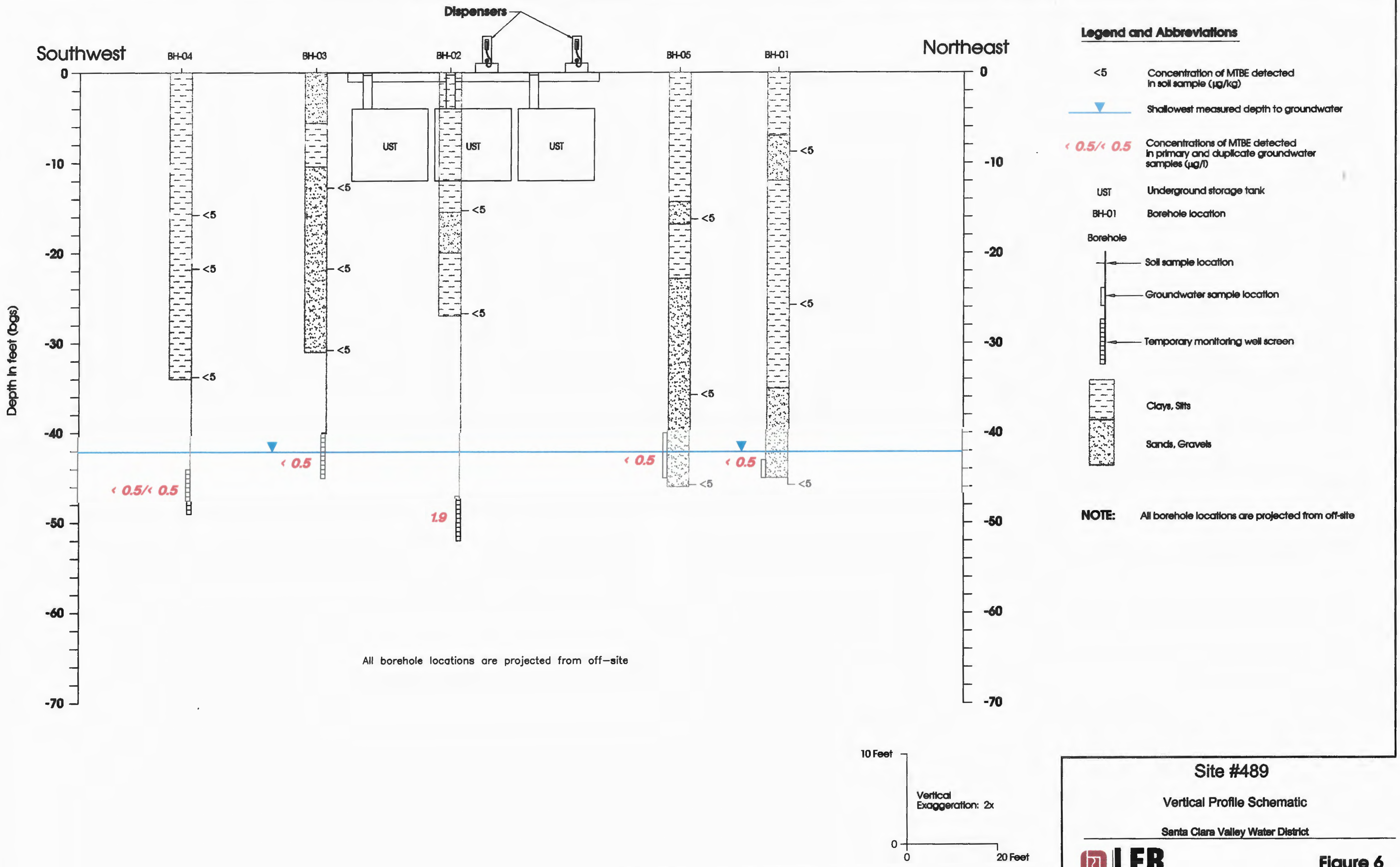
Site #489

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5


Dispensers
Southwest
Northeast
BH-04
BH-03
BH-02
BH-05
BH-01
UST
UST
UST
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
<5
‹ 0.5/‹ 0.5
‹ 0.5
1.9
‹ 0.5
‹ 0.5
All borehole locations are projected from off–site
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST Underground storage tank
BH-01 Borehole location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Clays, Silts
Sands, Gravels
NOTE: All borehole locations are projected from off-site
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

Site #489

Vertical Profile Schematic

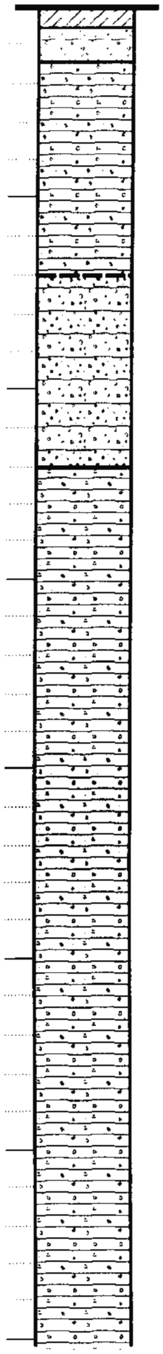
Santa Clara Valley Water District

LFR LEVINE·FRICKE

Figure 6

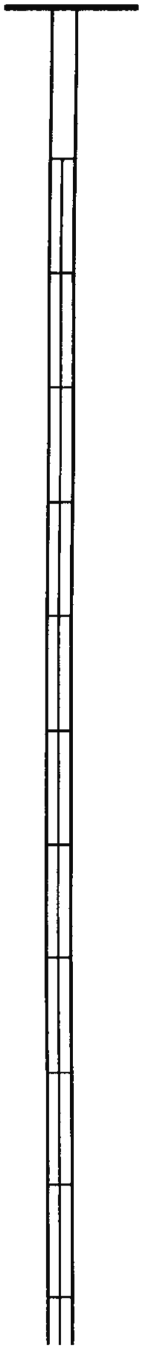
J:\ENGCAD\6730\CM\489.DWG 04/30/99 x–sec.PCP

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			6" thick ASPHALT. 12" thick Road Base.
5			SANDY CLAY with GRAVEL (CH), dark brown, moist, very dense, medium plasticity, rounded to angular gravel.
			SANDY GRAVEL with CLAY (GC), dark brown, moist, very dense, coarse, rounded gravel, medium sand.
10			
			SANDY CLAY with GRAVEL (CH), dark yellowish brown, moist, very dense, high plasticity, fine-to coarse-grained sand.
15			
		No recovery	
		No recovery	
20			
25			Yellowish brown, wet along fractures.
30			
35			

Sample Interval



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

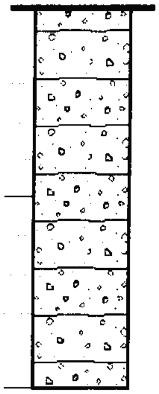
LFR
LEVINE•FRICKE

LITHOLOGY FOR 489-BH-01 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
				CLAYEY GRAVEL with SAND (GC), yellowish brown, wet, very dense, fine to coarse, rounded gravel, 10-20% coarse rounded sand, weathered rock fragments.		
40					40	
	▼					
45				BOTTOM OF BORING AT 45 FEET.	45	
50					50	
55					55	
60					60	
65					65	
70					70	



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

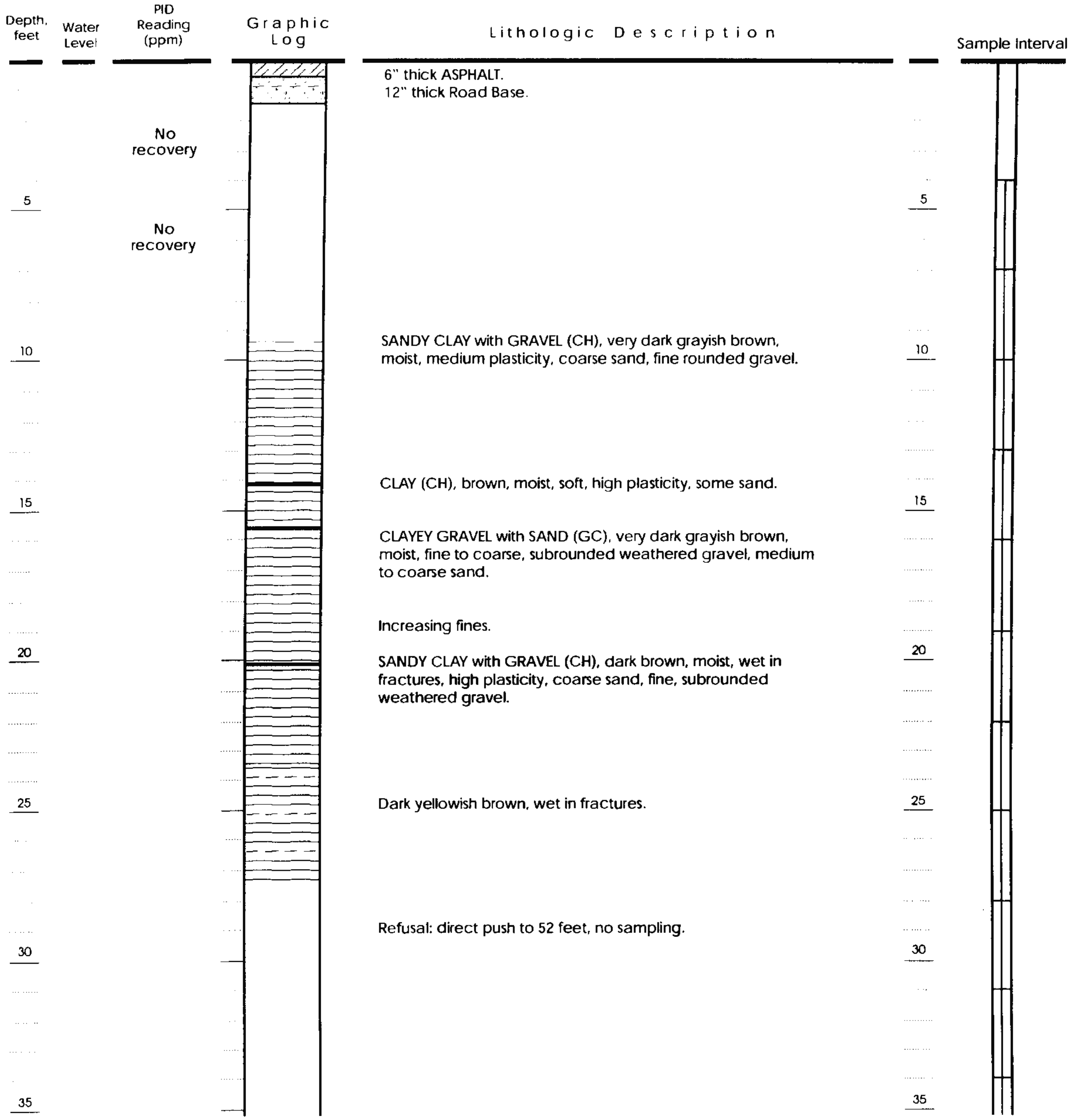
EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



6" thick ASPHALT.
12" thick Road Base.

SANDY CLAY with GRAVEL (CH), very dark grayish brown, moist, medium plasticity, coarse sand, fine rounded gravel.

CLAY (CH), brown, moist, soft, high plasticity, some sand.

CLAYEY GRAVEL with SAND (GC), very dark grayish brown, moist, fine to coarse, subrounded weathered gravel, medium to coarse sand.

Increasing fines.

SANDY CLAY with GRAVEL (CH), dark brown, moist, wet in fractures, high plasticity, coarse sand, fine, subrounded weathered gravel.

Dark yellowish brown, wet in fractures.

Refusal: direct push to 52 feet, no sampling.

cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

☰	Clay
▤	Silt
░	Sand
▩	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
40					40	
45					45	
50				BOTTOM OF BORING AT 52 FEET.	50	
55					55	
60					60	
65					65	
70					70	

EXPLANATION

▤	Clay
▭	Silt
░	Sand
▒	Gravel

PID -Photoionization Detector

▼ Water level at time of drilling

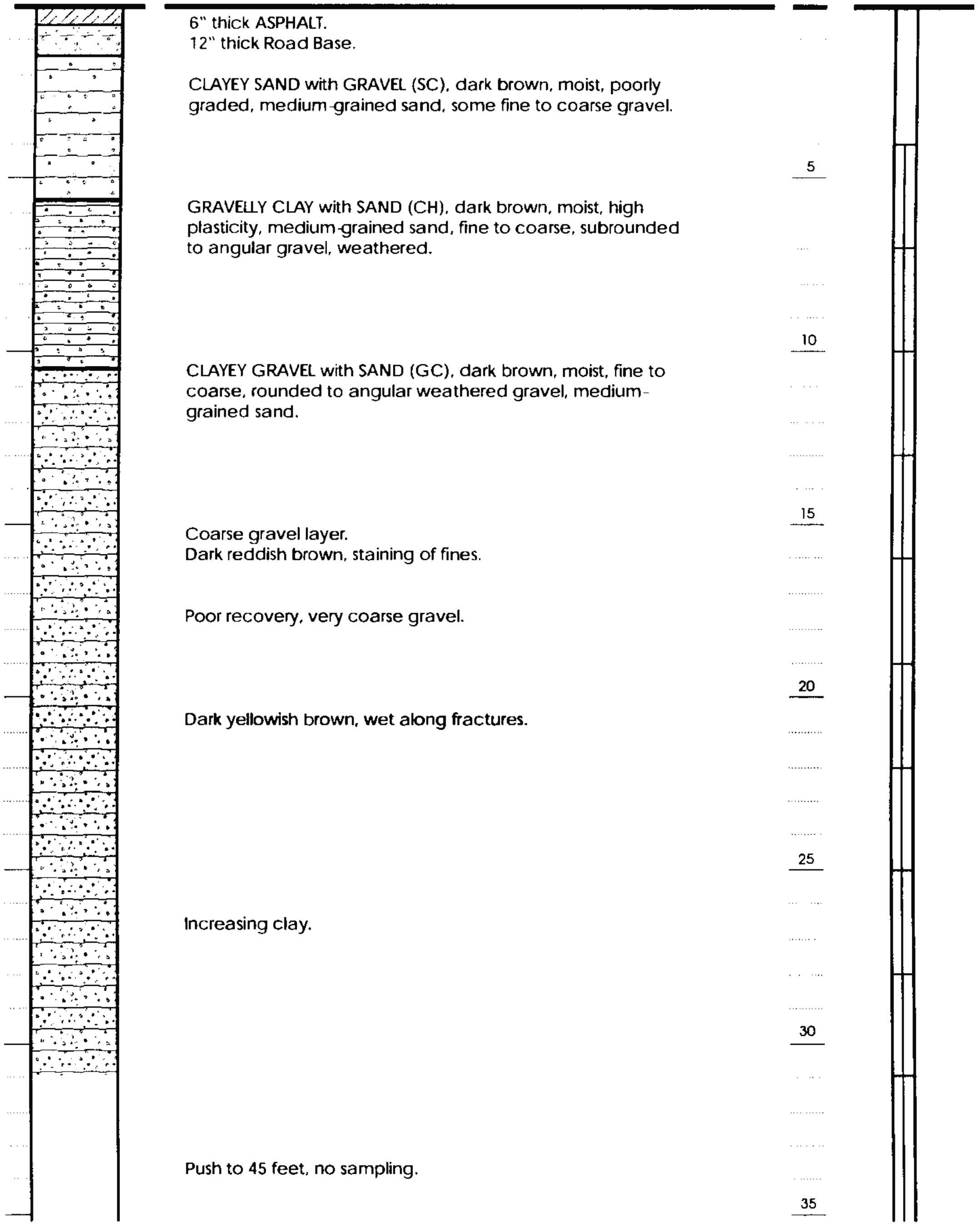
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

LFR
LEVINE·FRICKE

LITHOLOGY FOR 489-BH-02 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Depth, feet
0			6" thick ASPHALT. 12" thick Road Base.	0
			CLAYEY SAND with GRAVEL (SC), dark brown, moist, poorly graded, medium-grained sand, some fine to coarse gravel.	
		0.1		
5				5
			GRAVELLY CLAY with SAND (CH), dark brown, moist, high plasticity, medium-grained sand, fine to coarse, subrounded to angular gravel, weathered.	
		0.0		
10				10
			CLAYEY GRAVEL with SAND (GC), dark brown, moist, fine to coarse, rounded to angular weathered gravel, medium-grained sand.	
		0.9		
15				15
			Coarse gravel layer. Dark reddish brown, staining of fines.	
			Poor recovery, very coarse gravel.	
20				20
			Dark yellowish brown, wet along fractures.	
		1.7		
25				25
			Increasing clay.	
30				30
			Push to 45 feet, no sampling.	
35				35

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 17, 1999
LFR Geologist:	Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▦ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

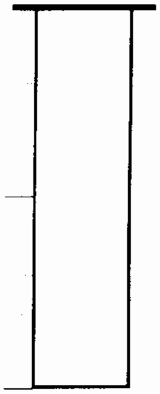
LFR
LEVINE·FRICKE

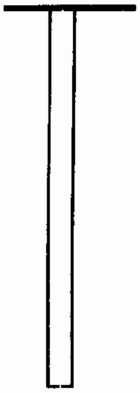
LITHOLOGY FOR 489-BH-03 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
40					40	
	▼					
45				BOTTOM OF BORING AT 45 FEET.	45	
50					50	
55					55	
60					60	
65					65	
70					70	





Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ▤ Silt
- ⬚ Sand
- ▨ Gravel

PID -Photoionization Detector

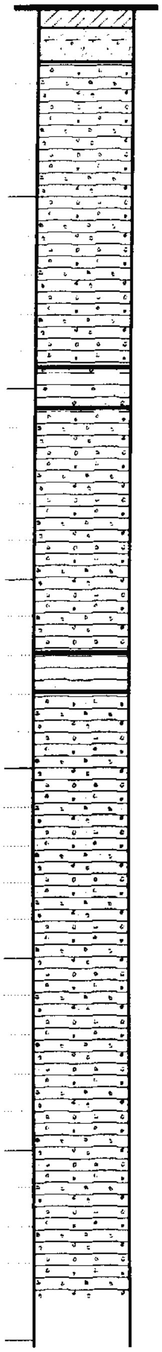
▼ Water level at time of drilling

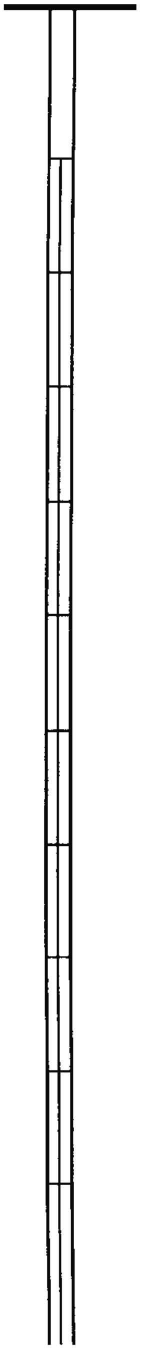
LFR
LEVINE•FRICKE

LITHOLOGY FOR 489-BH-03 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			6" thick ASPHALT. 12" thick Road Base.
			GRAVELLY CLAY with SAND (CH), very dark grayish brown, moist, high plasticity, rounded to angular fine gravel, 10-20% medium-grained sand.
		0.3	
5			Some orange-yellow mottling.
		0.1	
			Some coarse gravel greater than 1-inch diameter.
10		0.1	SANDY CLAY with GRAVEL (CH), dark olive-brown, moist, medium to high plasticity, medium-grained sand, trace fine gravel.
15			
		2.2	
			SANDY CLAY (CH), dark brown, moist, high plasticity, rounded coarse sand, trace dark yellow to red mottling.
20			GRAVELLY CLAY with SAND (CH), dark brown, moist, high plasticity, subrounded to angular, fine to coarse gravel, medium-grained sand, trace dark orange/yellow mottling.
		0.3	
25			
			Dark yellowish brown, increasing clay.
		1.6	
30			Medium plasticity, increasing sand.
			Wet along fractures(?) with light yellowish brown silt.
			Direct push to 49 feet.
35			

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 16, 1999
LFR Geologist:	Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▭ Silt
- ░ Sand
- ▨ Gravel

PID - Photoionization Detector

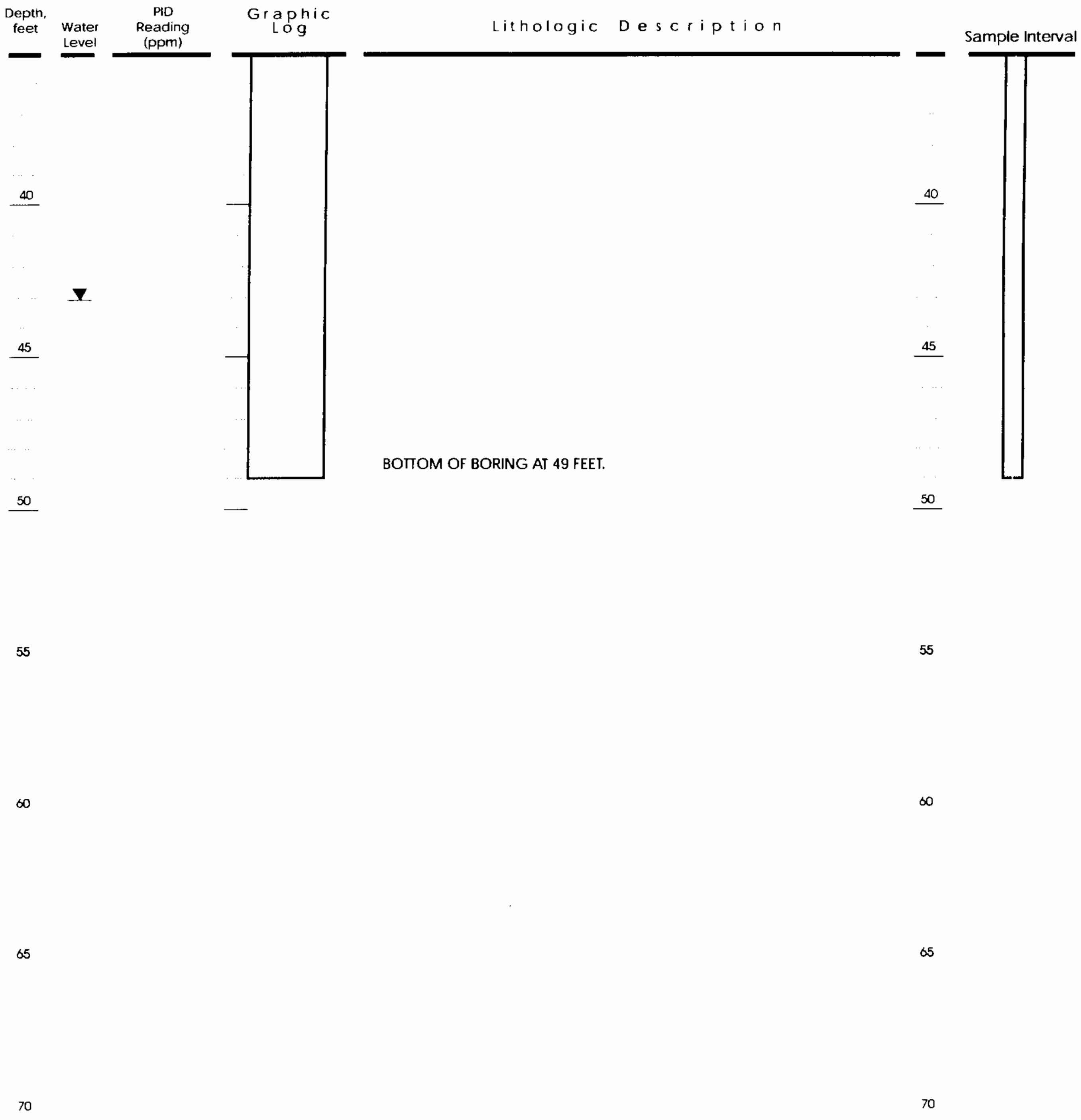
▼ Water level at time of drilling

LFR LEVINE·FRICKE

LITHOLOGY FOR 489-BH-04 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



BOTTOM OF BORING AT 49 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 16, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

☰	Clay
▤	Silt
▨	Sand
▩	Gravel

PID - Photoionization Detector

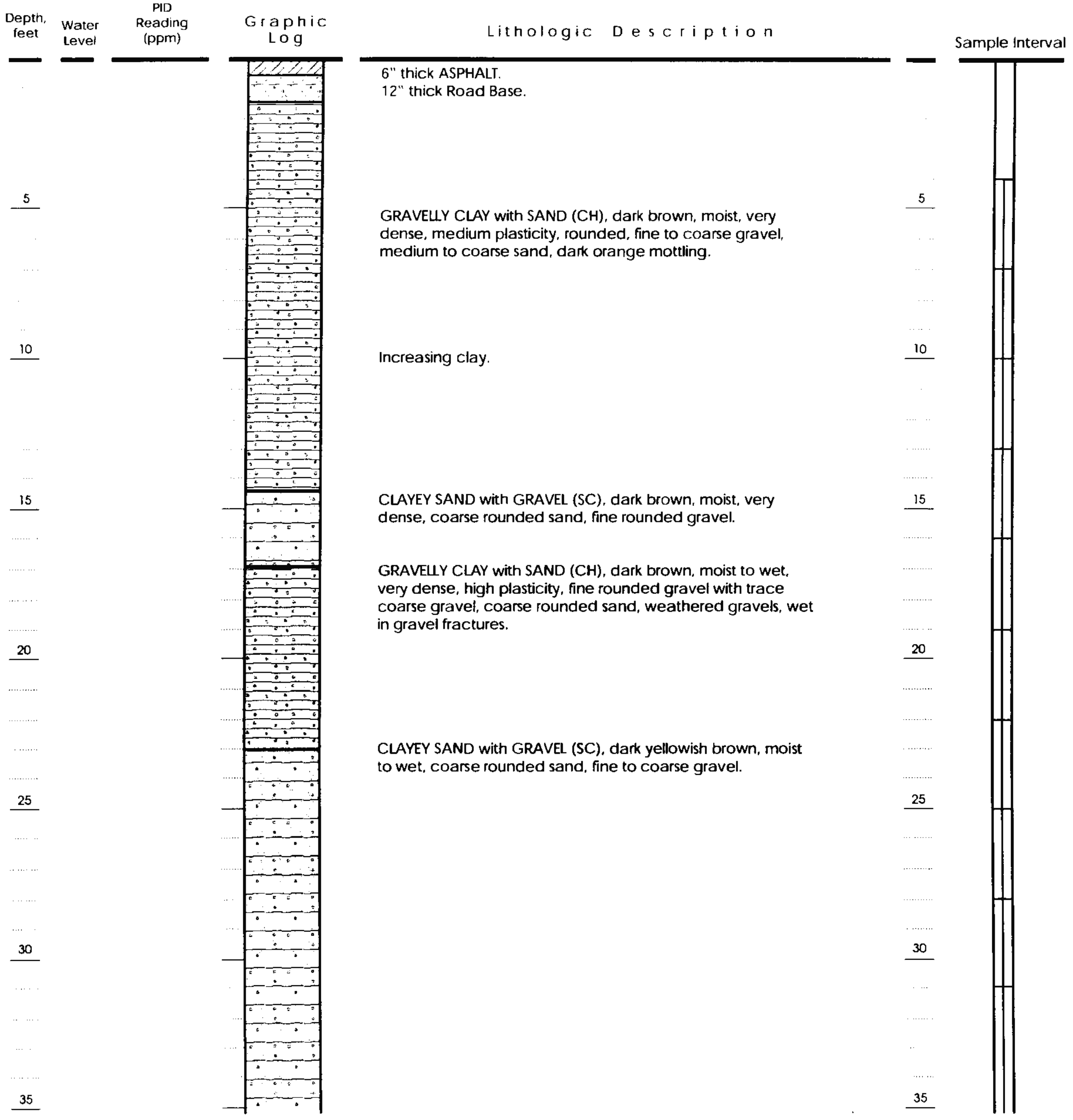
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 489-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



6" thick ASPHALT.
12" thick Road Base.

GRAVELLY CLAY with SAND (CH), dark brown, moist, very dense, medium plasticity, rounded, fine to coarse gravel, medium to coarse sand, dark orange mottling.

Increasing clay.

CLAYEY SAND with GRAVEL (SC), dark brown, moist, very dense, coarse rounded sand, fine rounded gravel.

GRAVELLY CLAY with SAND (CH), dark brown, moist to wet, very dense, high plasticity, fine rounded gravel with trace coarse gravel, coarse rounded sand, weathered gravels, wet in gravel fractures.

CLAYEY SAND with GRAVEL (SC), dark yellowish brown, moist to wet, coarse rounded sand, fine to coarse gravel.

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 18, 1999
LFR Geologist:	Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

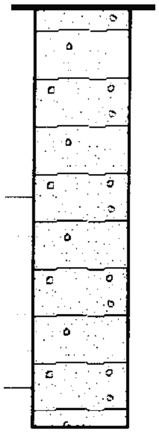
LFR
LEVINE•FRICKE

LITHOLOGY FOR 489-BH-05 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
				CLAYEY SAND with GRAVEL (SC), yellowish brown, wet, coarse rounded sand, fine to coarse rounded gravel, with weathered rock fragments.		
40					40	
	▼					
45				BOTTOM OF BORING AT 46 FEET.	45	
50					50	
55					55	
60					60	
65					65	
70					70	



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤ Clay
▦ Silt
⬚ Sand
▩ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 489-BH-05 *(page 2 of 2)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 490

Santa Clara County Department of Roads & Airports
13600 Murphy Road
San Martin, California 95046

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Santa Clara County Department of Environmental Health, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to approximately 6 to 10 feet below ground surface (bgs) underlain by sands and gravels to approximately 32 feet bgs. Silts and clays were encountered from approximately 32 to 52 feet bgs.The shallowest depth to water measured was approximately 15 feet bgs (December 1998).

SYSTEM DESCRIPTION

The UST system at the site consists of two 10,000-gallon double-walled gasoline USTs and one 10,000-gallon double-walled diesel UST. All of the USTs are constructed of fiberglass reinforced plastic [FRP] with double-walled FRP piping. The UST system utilizes mechanical line leak detection and continuous interstitial monitoring for the piping and continuous interstitial monitoring for the USTs.

RESULTS

MtBE was detected in 1 of 17 soil-gas samples collected at this site at a concentration of 0.23 μg/l. MtBE was not detected in any of the 17 soil or 11 groundwater samples collected. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in one soil-gas sample at very low concentrations. Toluene (5.6 μg/kg) and xylenes (242 μg/kg) were detected in one soil sample.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available? No

Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 3 years
Years of operation as fueling facility:	Approximately 19 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Reportedly programmed for monthly in-tank gauging, but no print-out was available.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	No
Spill log reviewed?	Yes
Spill log comments:	No spills reported
Personnel training:	Appeared good. Attendant was knowledgable of system.

Comments:

Tanks are double walled within a vault filled with pea gravel - effectively providing tertiary containment. A Trace-Tek sensor was also installed, but abandoned due to false alarms.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To swale ~13.5' north (runs west to east) then to storm drain
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Cracks between pad and pavement; pavement in fair condition
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Vehicle maintenance building ~25' south of tank pad
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable
Comments:	

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # GJ-1

Date installed:	10/20/95
Tank capacity (gallons):	10,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	10/20/95
Date overfill protection equipment installed:	10/20/95
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # GJ-2

Date installed:	10/20/95
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	10/20/95
Date overfill protection equipment installed:	10/20/95
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # GJ-3

Date Installed:	10/20/95
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	10/20/95
Date overfill protection equipment installed:	10/20/95
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground

Leak detection:	Mechanical line leak detection Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #490

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
490-SG-01	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
490-SG-02	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
490-SG-03	11/25/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		15	<5	<100	<1	<1	<1	<1	<1	
490-SG-04	11/25/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
490-SG-05	11/25/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
490-SG-05-DUP		12	<5	<100	<1	<1	<1	<1	<1	
490-SG-06	11/25/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	6.1	
490-SG-06-SPL		12	0.23	NA	0.045	0.33	0.053	0.23	0.066	(a)
490-SG-07	11/25/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.011 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

UJ = Not detected at the estimated reporting limit shown

T[illegible]e 2

Summary of Chemical Analysis Results for Soil Samples - Site #490

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
490-BH-01	12/09/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
490-BH-02	12/09/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
490-BH-03	12/09/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
490-BH-04	12/10/98	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
490-BH-05	12/10/98	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
490-BH-06	12/10/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	1	<5	5.6	<5	160	82	<20	<20	<20	<200
		16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC._

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 490
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
490-BH-01	12/09/98	14.0-24.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-02	12/09/98	14.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
		22.0-24.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-02-DUP		22.0-24.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-02		28.0-30.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-03	12/09/98	14.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-04	12/10/98	14.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-05	12/10/98	14.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
490-BH-06	12/10/98	14.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
		22.0-24.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
		28.0-30.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:
All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

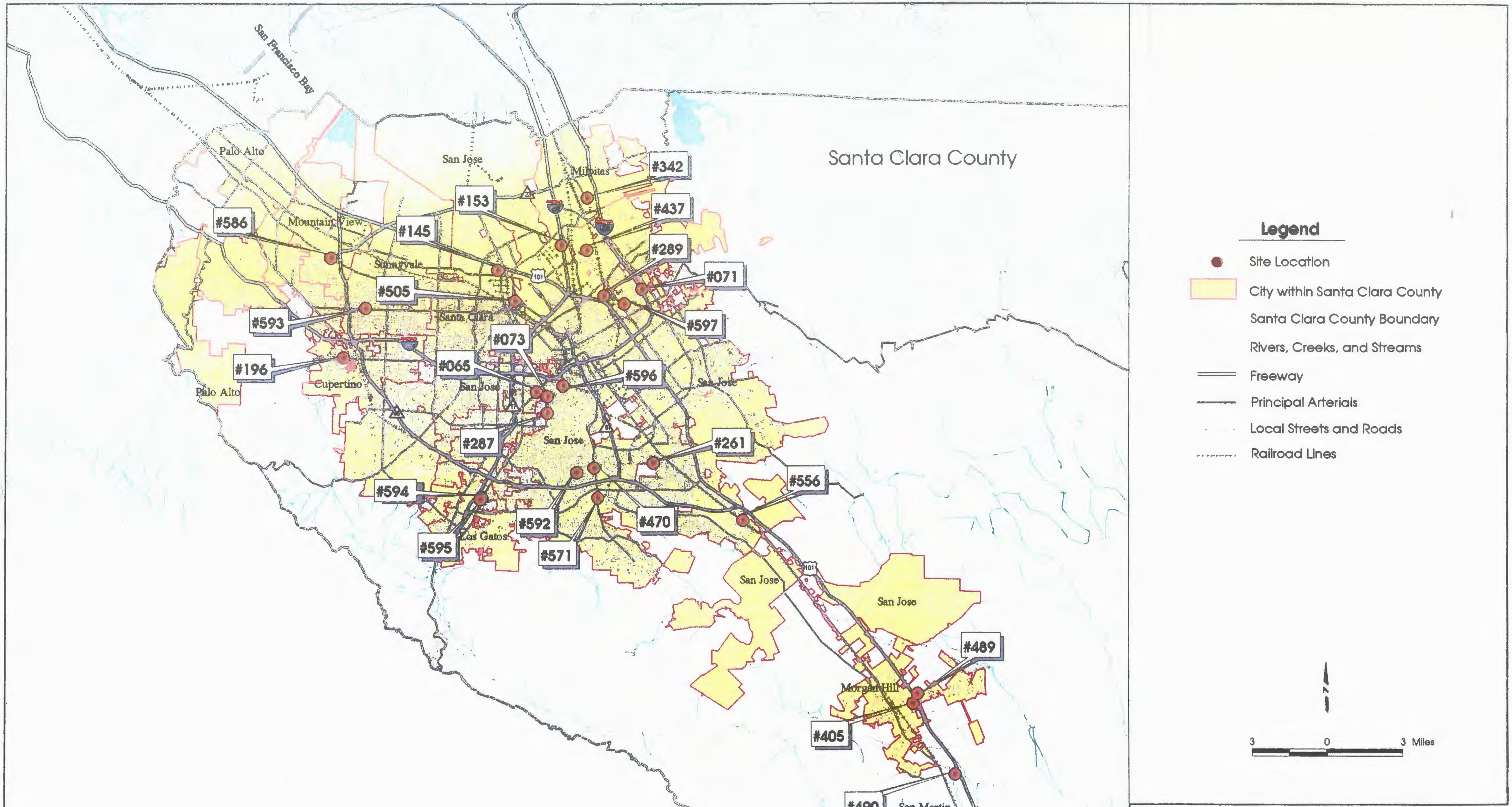
Table 4
Summary of Physical Parameters for Soil Samples - Site #490
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
490-BH-01	7.0 - 7.5	Brown gravelly clayey sand	0.07	11.39	141.2	126.8	24.72
490-BH-06	23.0 - 23.5	Brown gravelly clayey sand	0.05	11.82	141.4	126.5	24.90

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



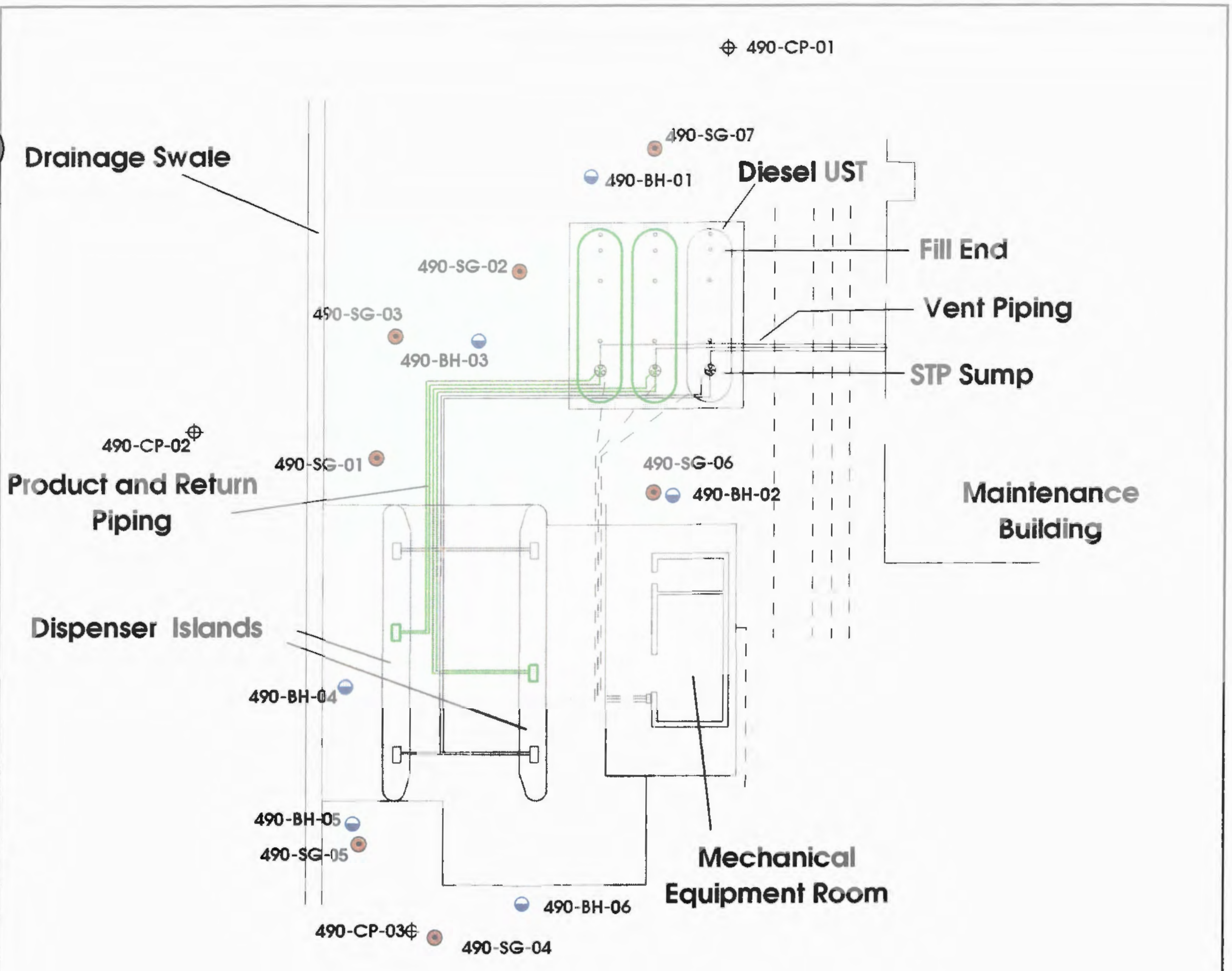
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

— — — — Underground utilities

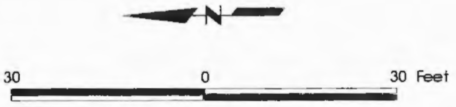
◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from County of Santa Clara Transportation Agency, Enlarged Plans, Drawing P-3, Gladys Jackson Coach Division, Hazardous Materials Capital Projects Program, San Martin, CA, by Greene Engineers of Campbell, CA, dated 12/10/92.



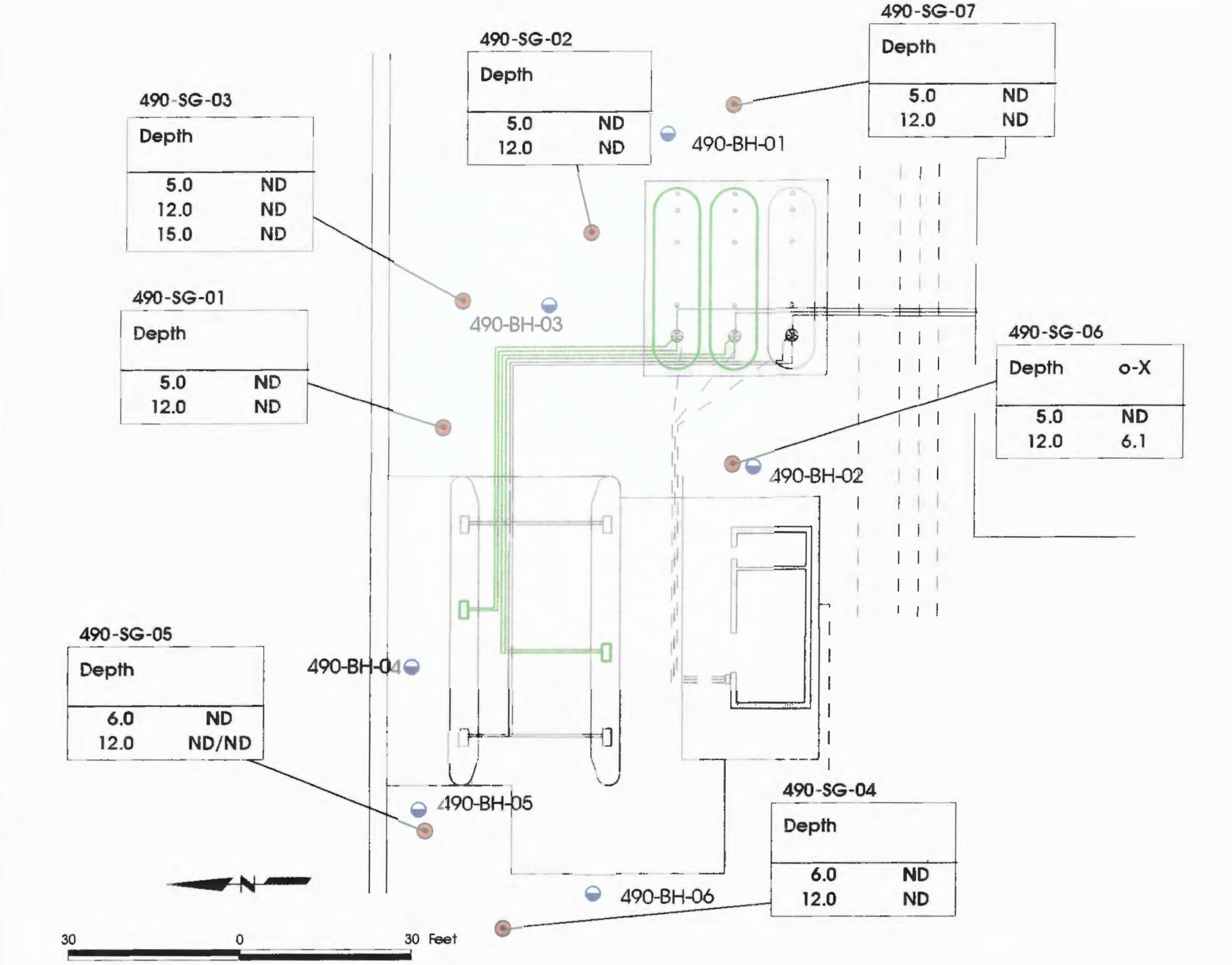
Site #490

Site Plan

Santa Clara Valley Water District

LFR LEVINE • FRICKE

Figure 2

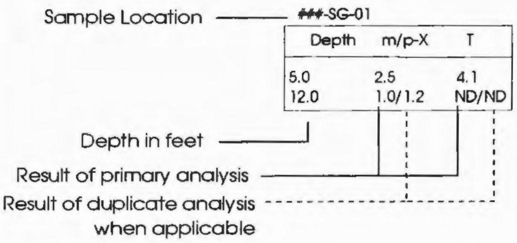


Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

– – – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

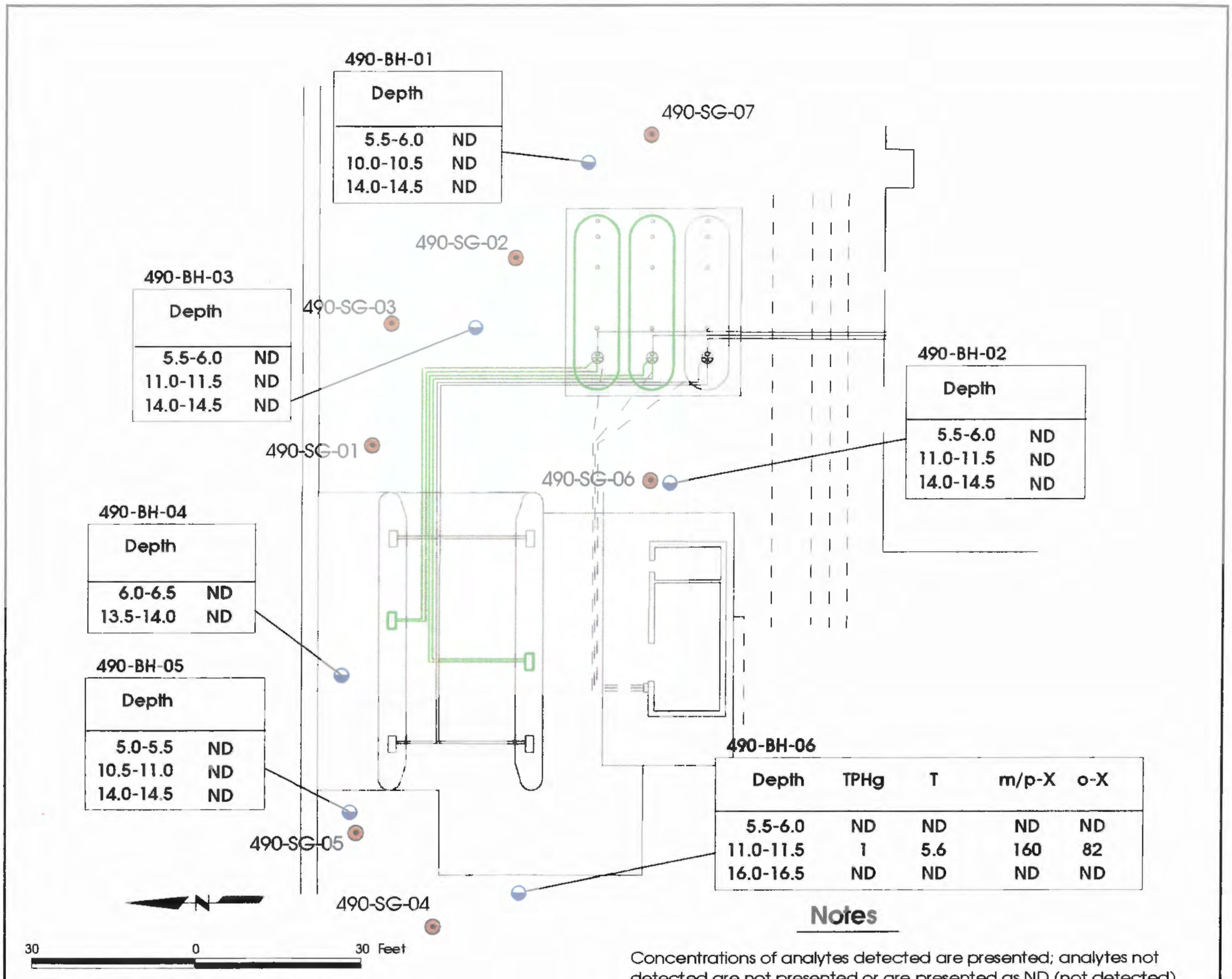
Site #490

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 3



490-BH-01

Depth	
5.5-6.0	ND
10.0-10.5	ND
14.0-14.5	ND

490-BH-02

Depth	
5.5-6.0	ND
11.0-11.5	ND
14.0-14.5	ND

490-BH-03

Depth	
5.5-6.0	ND
11.0-11.5	ND
14.0-14.5	ND

490-BH-04

Depth	
6.0-6.5	ND
13.5-14.0	ND

490-BH-05

Depth	
5.0-5.5	ND
10.5-11.0	ND
14.0-14.5	ND

490-BH-06

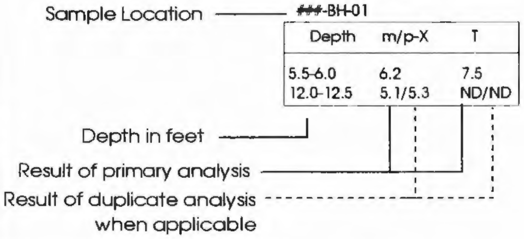
Depth	TPHg	T	m/p-X	o-X
5.5-6.0	ND	ND	ND	ND
11.0-11.5	1	5.6	160	82
16.0-16.5	ND	ND	ND	ND

Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

– – – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

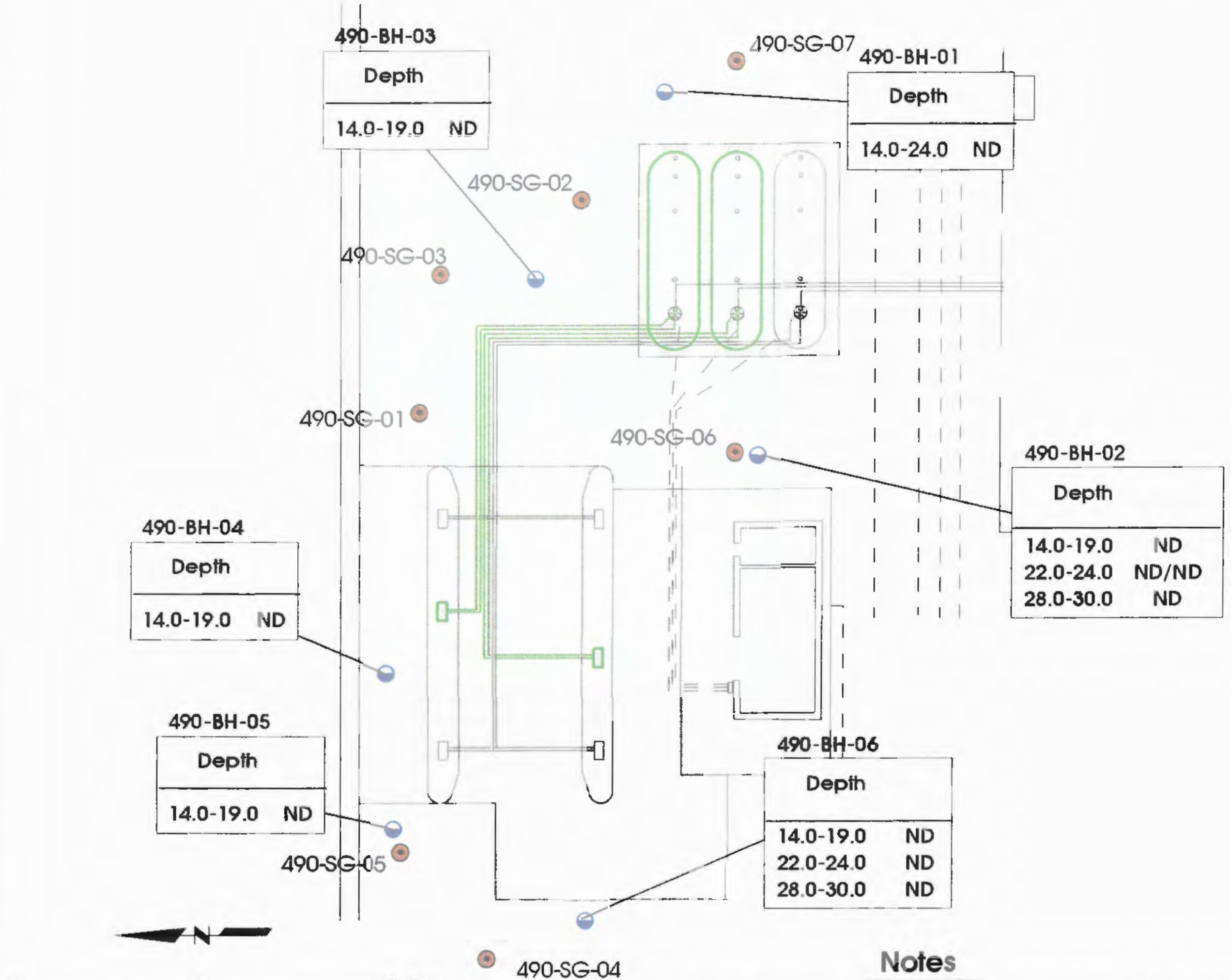
Site #490

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4

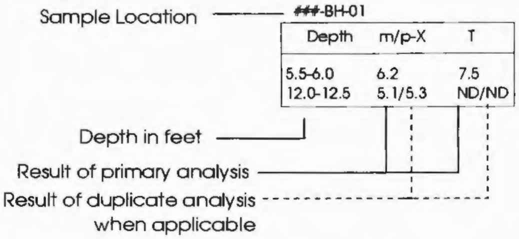


Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

— — — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

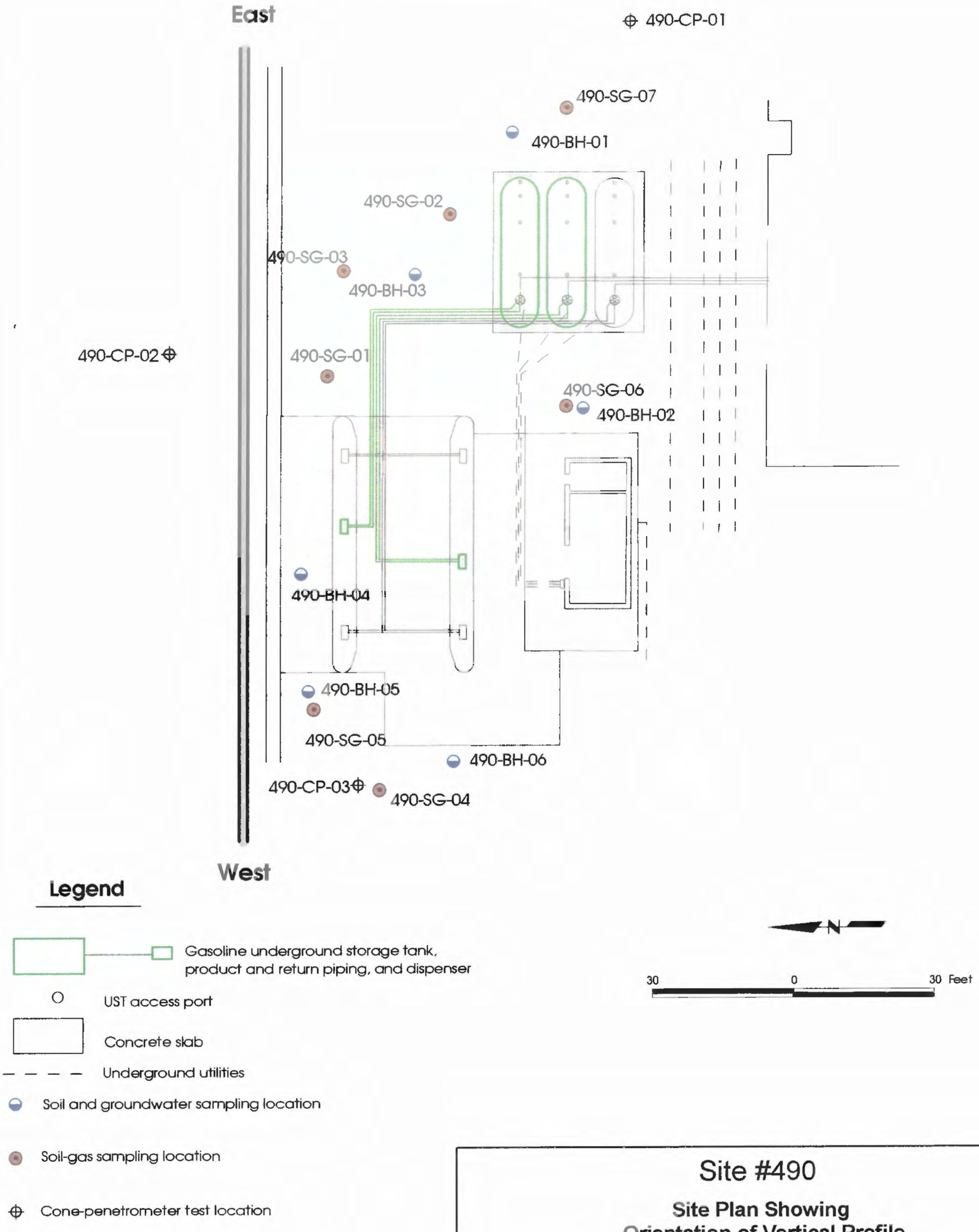
Site #490

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 5



See Figure 2 for description of site features and origin of base map.

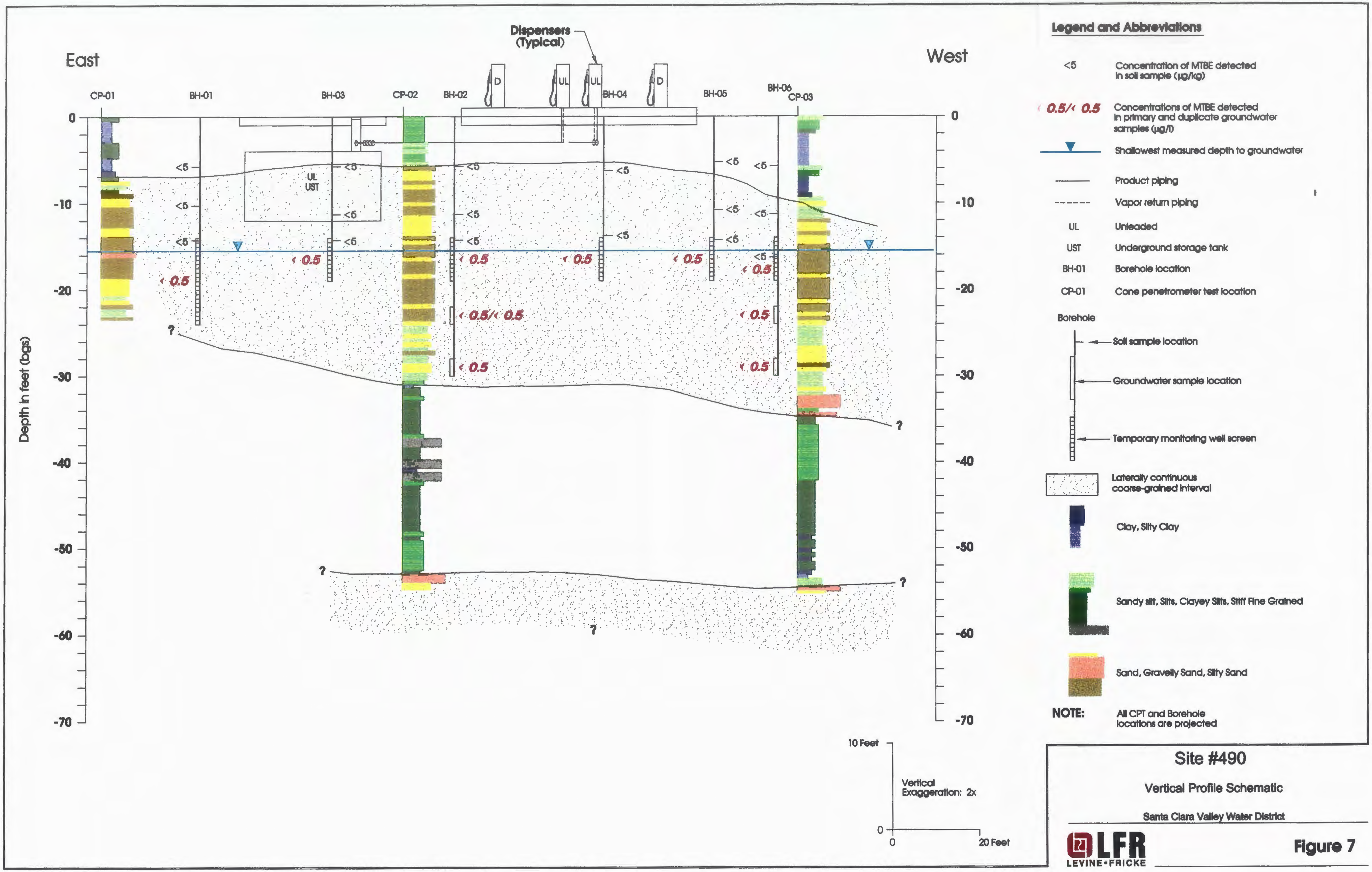
Site #490

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6



East
West
Dispensers (Typical)
CP-01
BH-01
BH-03
CP-02
BH-02
BH-04
BH-05
BH-06
CP-03
D
UL
UL
D
UL UST
<5
‹ 0.5
‹ 0.5/‹ 0.5
?
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
Vapor return piping
UL Unleaded
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Laterally continuous coarse-grained interval
Clay, Silty Clay
Sandy silt, Silts, Clayey Silts, Stiff Fine Grained
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

Site #490

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 7

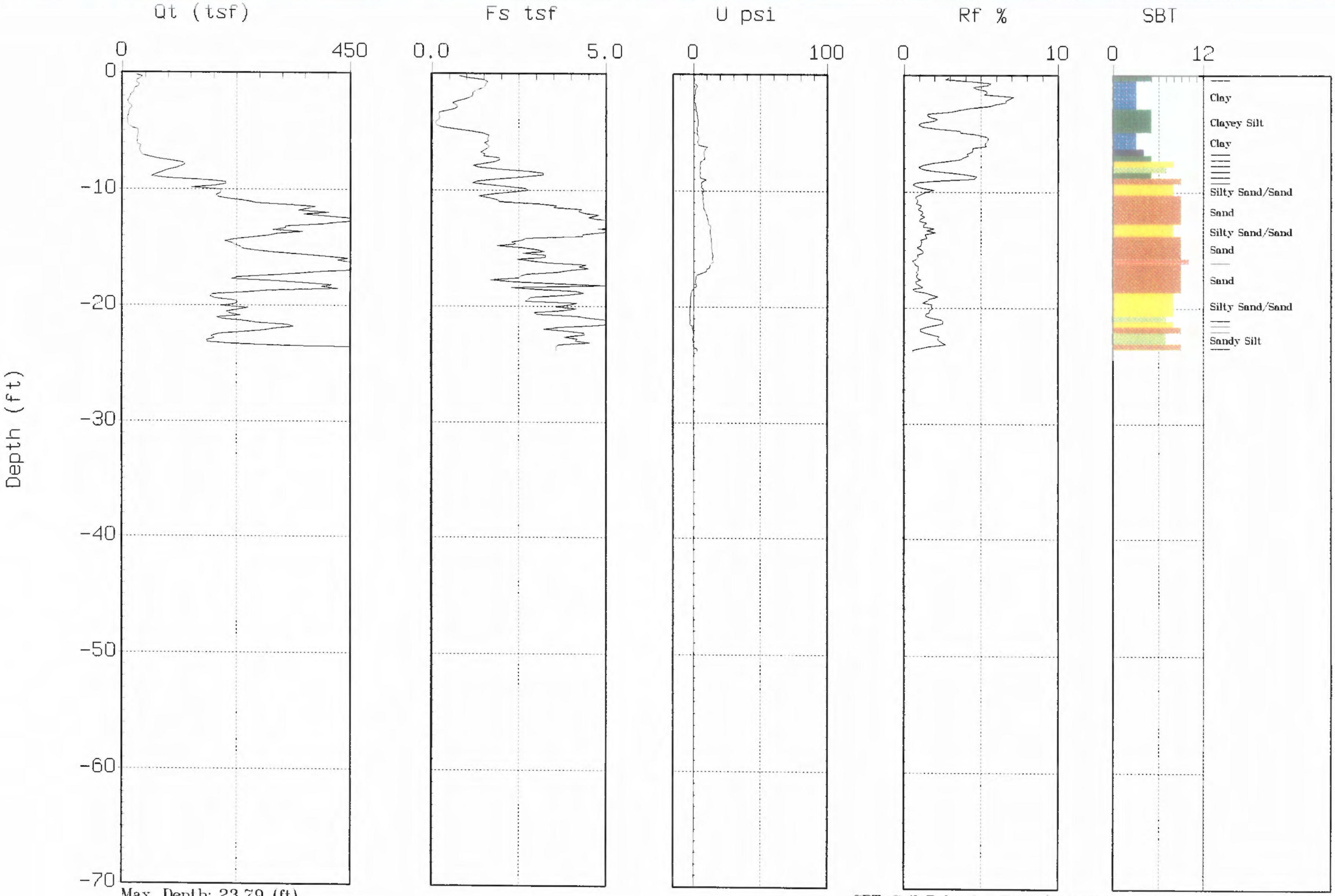
J:\ENGCAD\6730\CM#490.DWG 03/11/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: #490
Location : 490-CP-01

Geologist: Todd Miller
Date : 11:06:98 10:03



Max. Depth: 23.79 (ft)

Depth Inc.: 0.164 (ft)

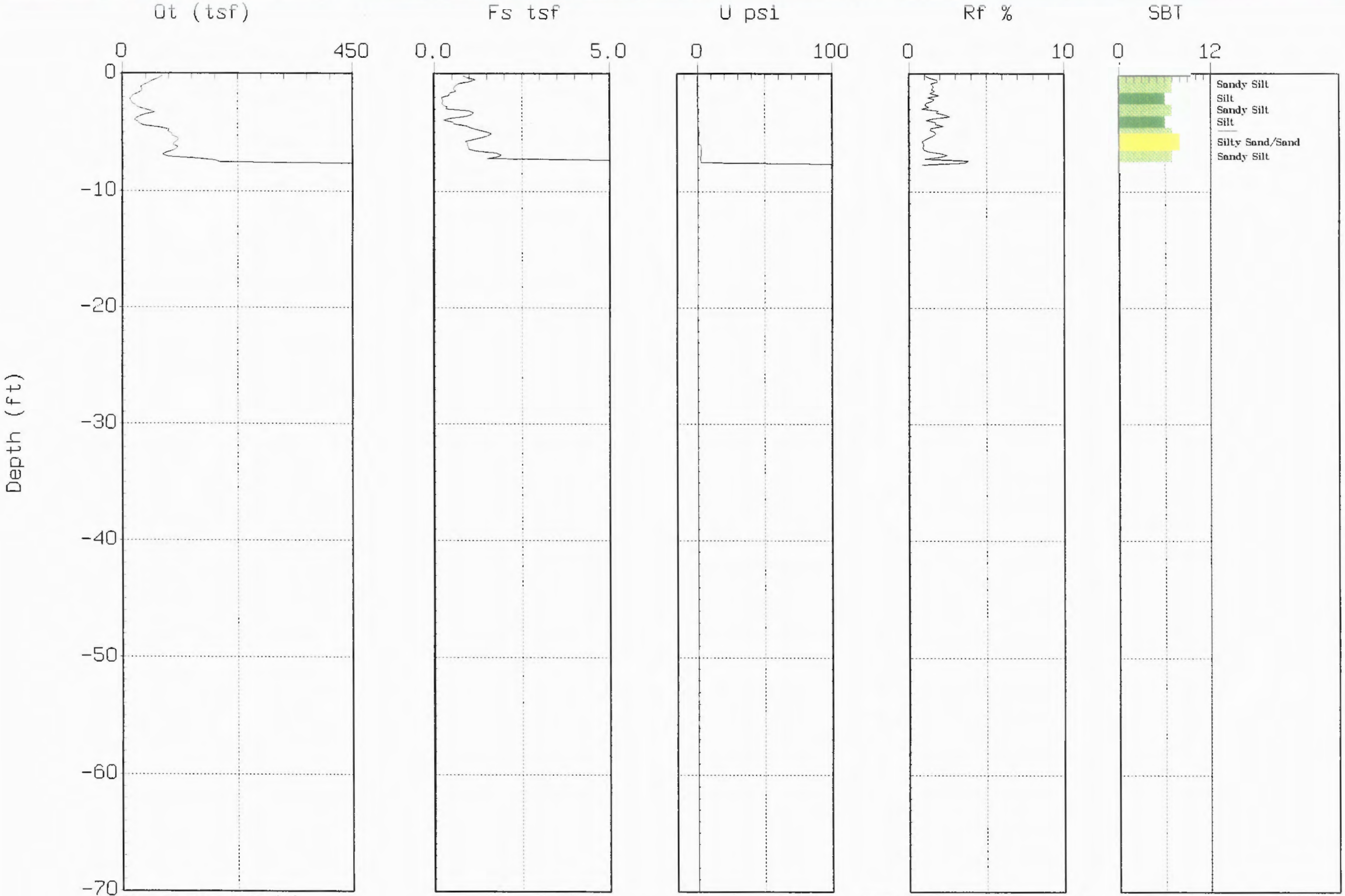
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #490
Location : 490-CP-02

Geologist: Todd Miller
Date : 11:06:98 11:17



Max. Depth: 7.71 (ft)

Depth Inc.: 0.164 (ft)

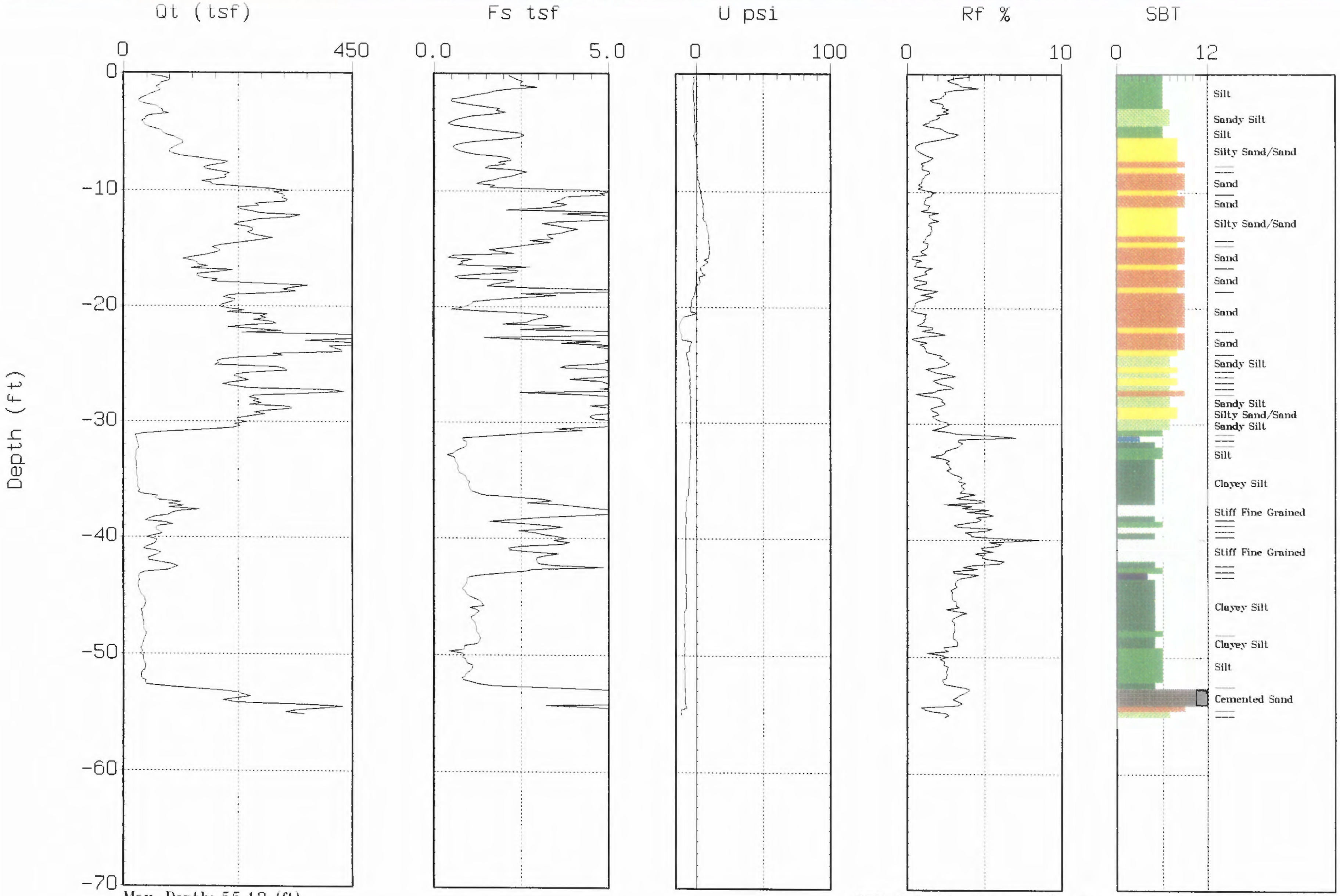
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #490
Location : 490-CP-02A

Geologist: Todd Miller
Date : 11:06:98 11:52



Max. Depth: 55.12 (ft)

Depth Inc.: 0.164 (ft)

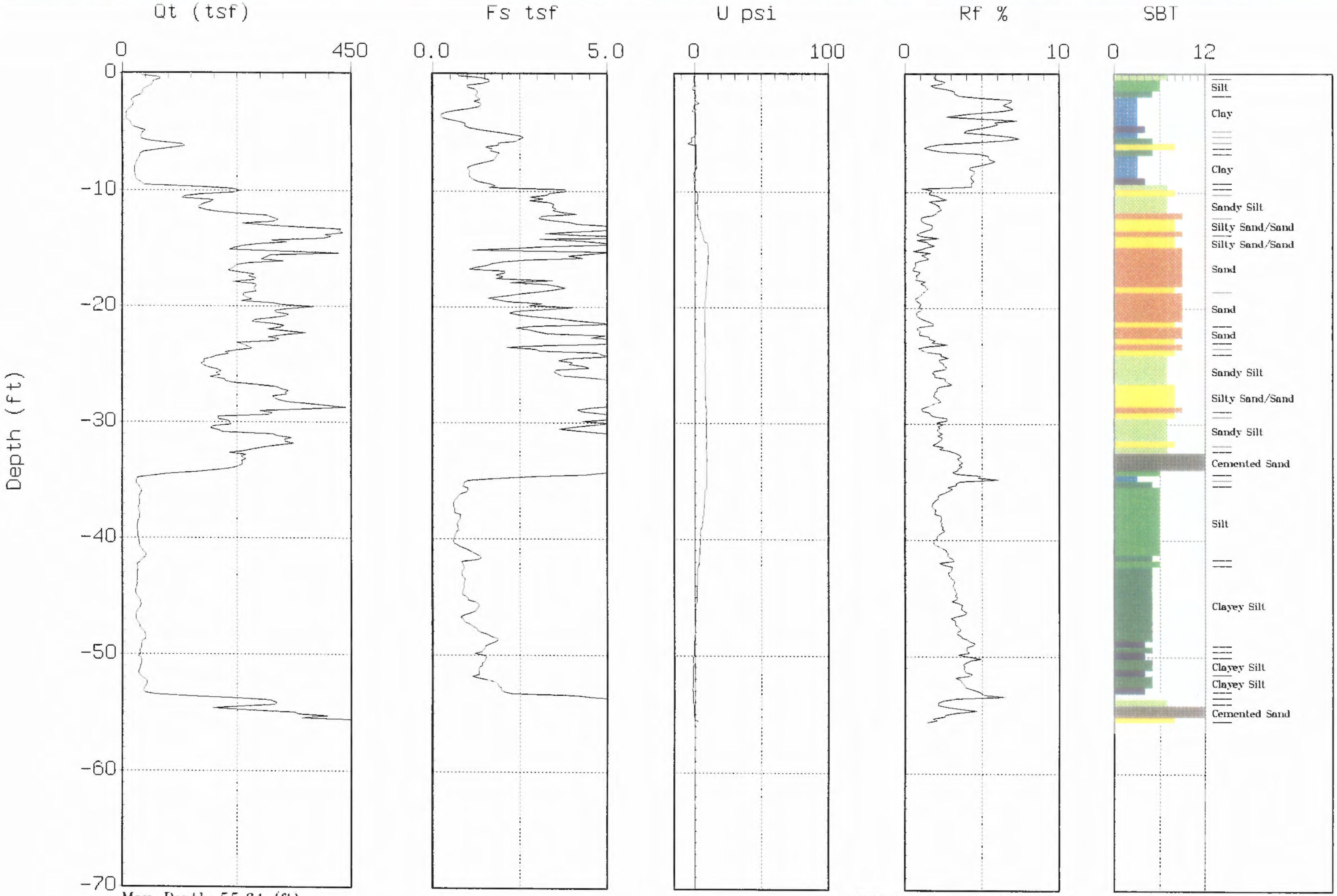
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #490
Location : 490-CP-03

Geologist: Todd Miller
Date : 11:06:98 13:31



Max. Depth: 55.61 (ft)

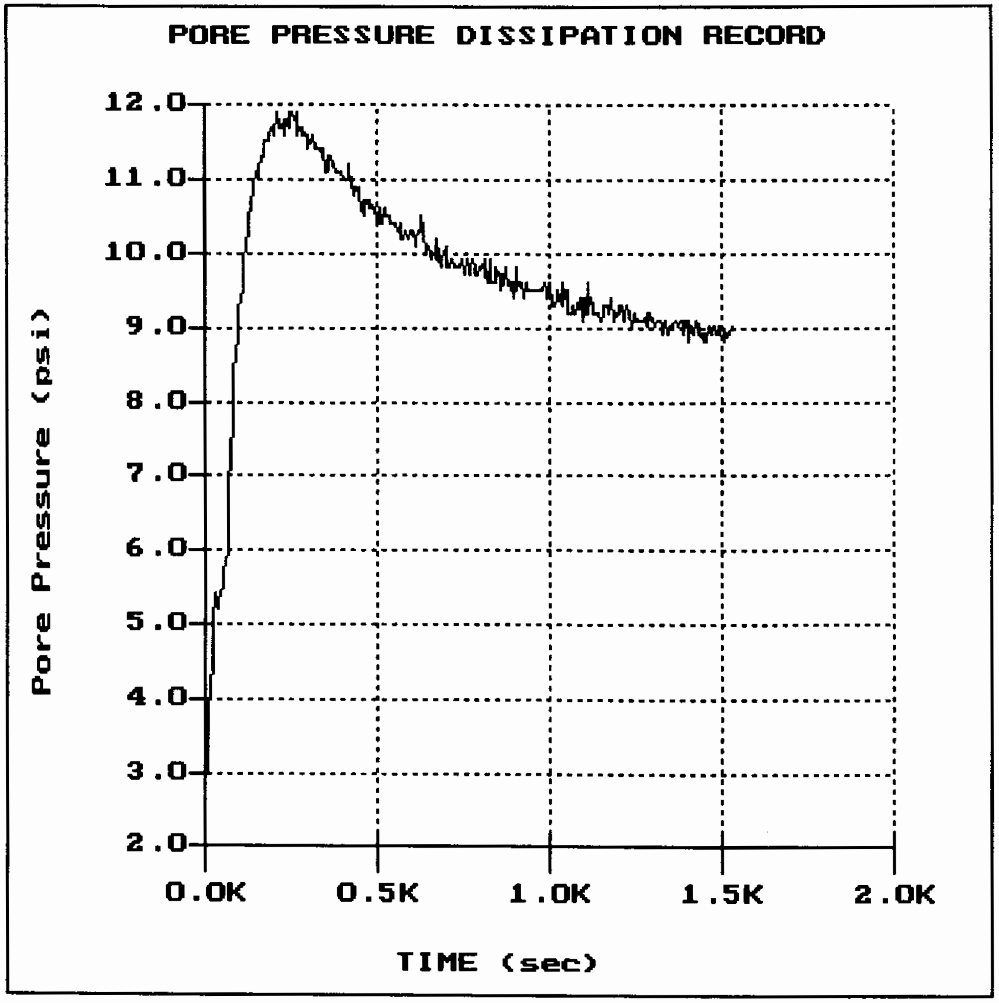
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:490-CP-01
Location:#490

Cone:20 TON AD071
Date:11:06:98 10:03



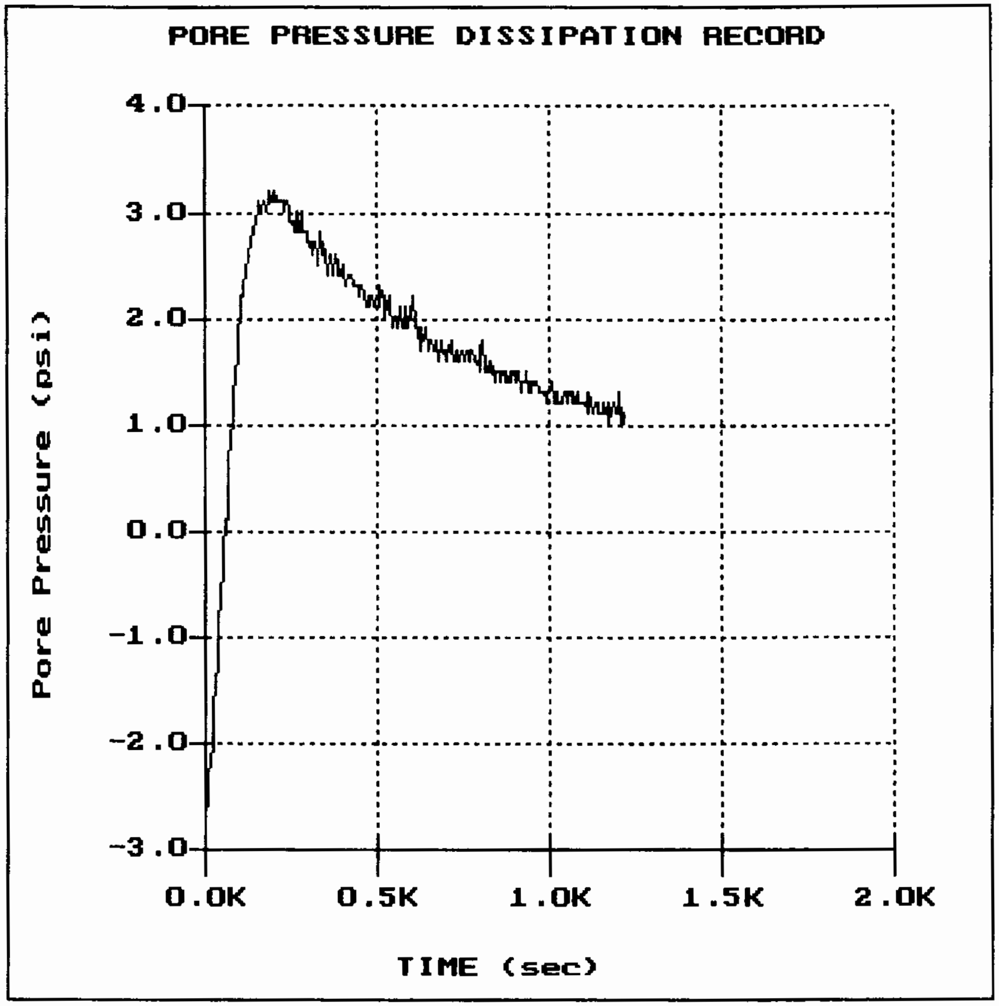
File: 108C21.PPR
Depth (m): 7.25
(ft): 23.79
Duration : 1530.0s

LFR LEVINE FRICKE

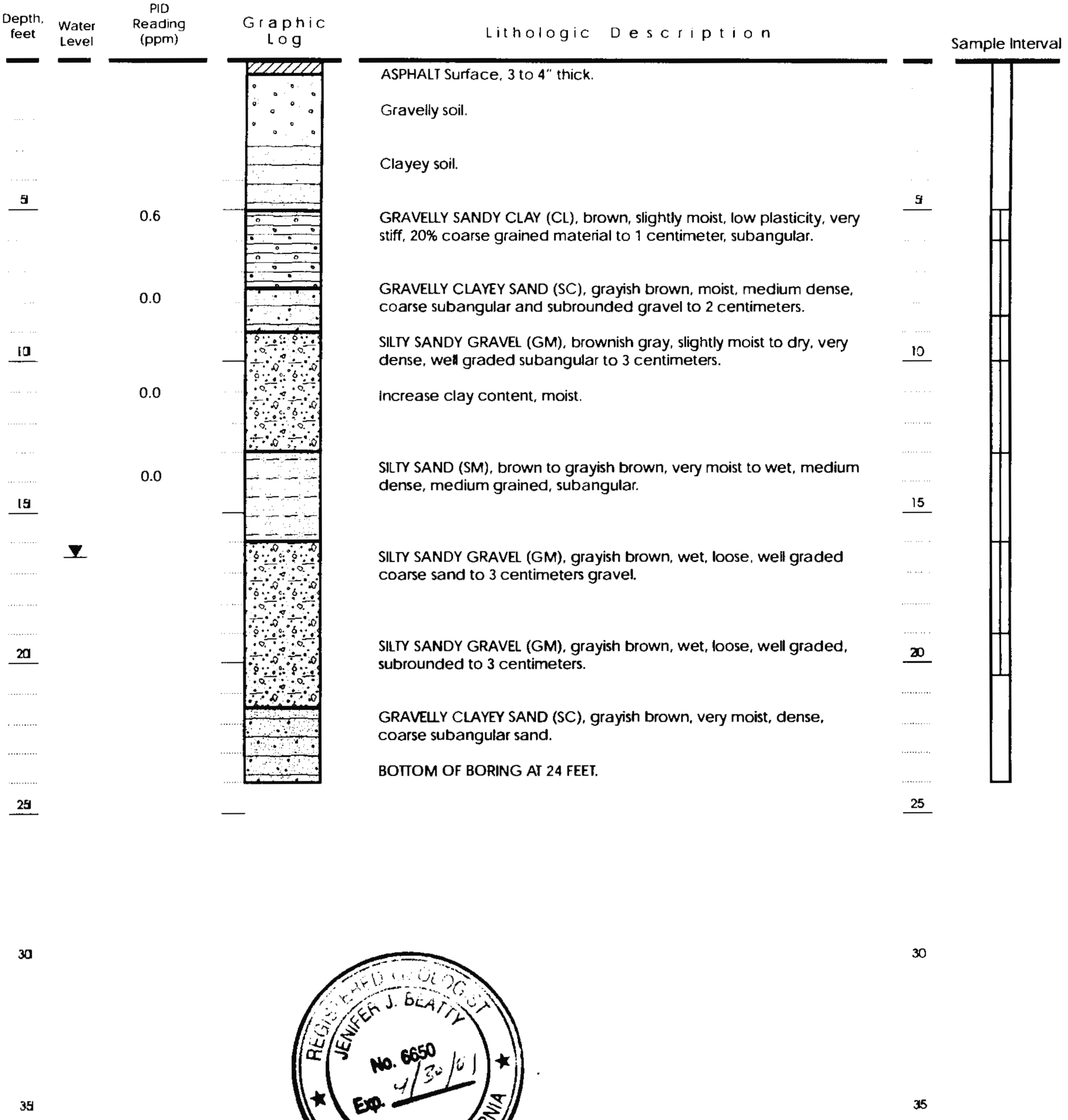
Hole: 490-CP-02A
Location: #490

Cone: 20 TON AD071
Date: 11:06:98 11:52

File: 108C22A.PPR
Depth (m): 6.20
(ft): 20.34
Duration : 1220.0s



SCVWD PILOT STUDY



Water Level	PID Reading (ppm)	Lithologic Description
		ASPHALT Surface, 3 to 4" thick.
		Gravelly soil.
		Clayey soil.
	0.6	GRAVELLY SANDY CLAY (CL), brown, slightly moist, low plasticity, very stiff, 20% coarse grained material to 1 centimeter, subangular.
	0.0	GRAVELLY CLAYEY SAND (SC), grayish brown, moist, medium dense, coarse subangular and subrounded gravel to 2 centimeters.
		SILTY SANDY GRAVEL (GM), brownish gray, slightly moist to dry, very dense, well graded subangular to 3 centimeters.
	0.0	Increase clay content, moist.
	0.0	SILTY SAND (SM), brown to grayish brown, very moist to wet, medium dense, medium grained, subangular.
▼		SILTY SANDY GRAVEL (GM), grayish brown, wet, loose, well graded coarse sand to 3 centimeters gravel.
		SILTY SANDY GRAVEL (GM), grayish brown, wet, loose, well graded, subrounded to 3 centimeters.
		GRAVELLY CLAYEY SAND (SC), grayish brown, very moist, dense, coarse subangular sand.
		BOTTOM OF BORING AT 24 FEET.

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 9, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

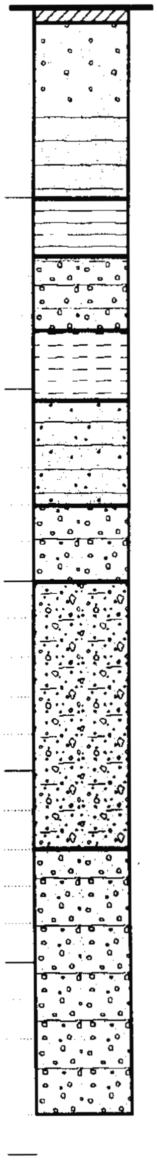
EXPLANATION

☰	Clay
▤	Silt
⛆	Sand
⁘	Gravel

PID - Photoionization Detector

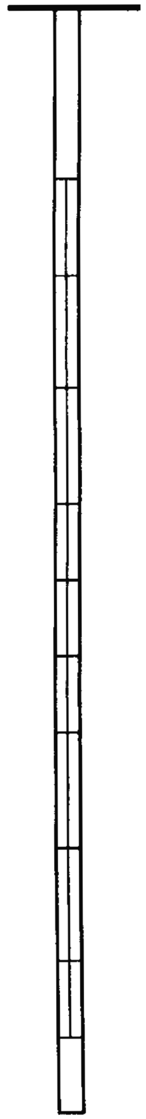
▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Surface, 3 to 4" thick.
			Gravelly soil.
			Clayey soil.
5			
			CLAY (CL), dark yellowish brown, slightly moist, low plasticity, stiff.
		0.0	
		0.0	CLAYEY GRAVEL (GC), grayish brown, slightly moist to dry, medium dense, angular sand, subangular to 2 centimeters.
			SANDY SILT (ML), grayish brown, dry to slightly moist, very stiff.
10			
		0.0	GRAVELLY CLAYEY SAND (SC), grayish brown, moist, medium dense, coarse, subangular, sand.
			CLAYEY SANDY GRAVEL (GC), grayish brown, very moist, dense, well graded angular to subrounded gravel.
15	▼		SILTY SANDY GRAVEL (GM), grayish brown, wet, loose.
		Poor recovery	Slightly moist, very dense.
			Wet, medium dense to loose.
20		0.0	
			Very moist to wet, dense, coarse sand and gravel.
			CLAYEY SANDY GRAVEL (GC), grayish brown, wet, medium dense, well graded coarse sand and subangular to rounded gravel to 3 centimeters.
25			Very moist to wet.
		0.0	CLAYEY SANDY GRAVEL (GC), grayish brown, moist to wet, very dense.
			BOTTOM OF BORING AT 29 FEET.
30			
35			

Sample Interval



No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 9, 1998
LFR Geologist: Todd Miller, R.G., C.H.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

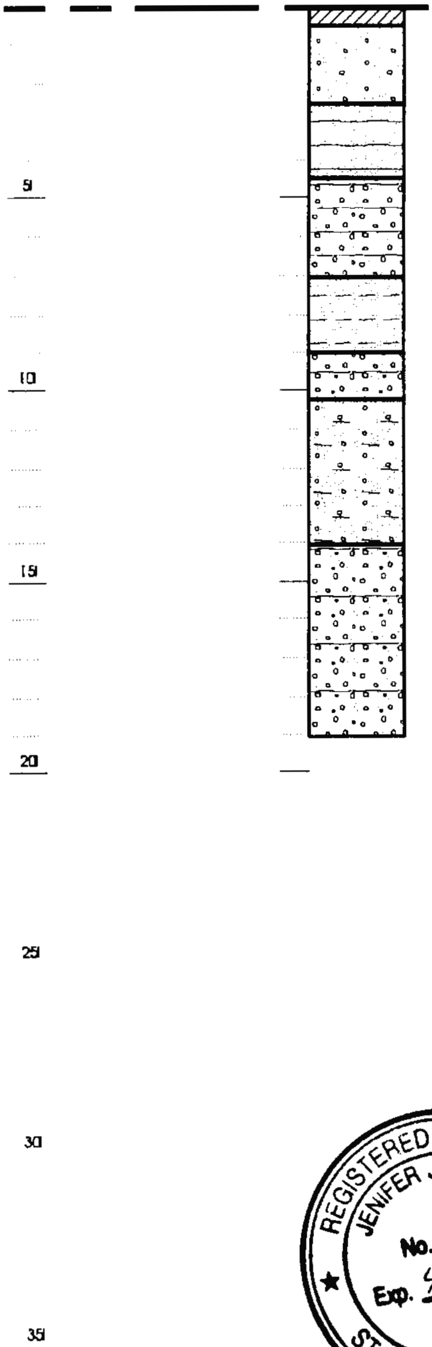
LFR LEVINE•FRICKE

LITHOLOGY FOR 490-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT Surface, 3 to 4" thick.

Gravelly soil.

Clayey soil, some coarse gravel and cobbles.

SANDY CLAYEY GRAVEL (GC), grayish brown, slightly moist, dense, well graded, subangular to 3 centimeters, 25% clay.

SILTY SAND (SM), grayish brown, moist, dense, medium to coarse gravel, 20% silt.

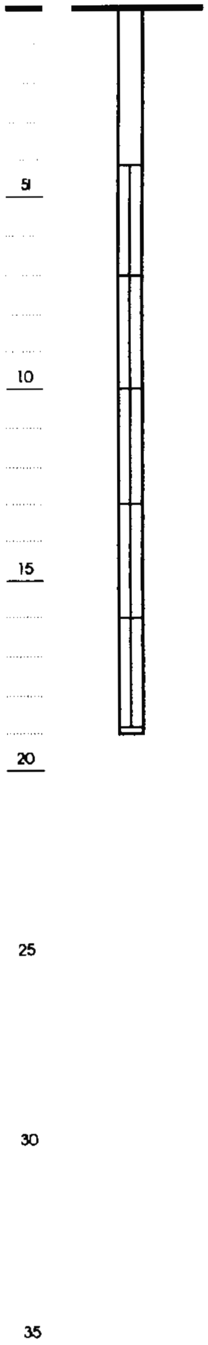
CLAYEY SANDY GRAVEL (GC), grayish brown, slightly moist, dense, well graded subangular to 4 centimeters, coarse sand.

SILTY GRAVELLY SAND (SM), brownish gray and olive gray, slightly moist to dry, very dense to hard, predominantly medium to coarse sand and fine gravel, 25% silt.

CLAYEY SANDY GRAVEL (GC), grayish brown, moist, wet in places, medium dense, well graded, subangular and subrounded sand clasts to 2 centimeters.

Very moist to wet, coarse, subrounded.

BOTTOM OF BORING AT 19 FEET.



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 9, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

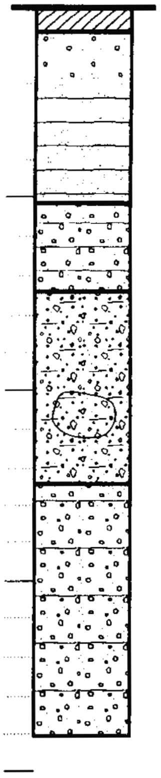
▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT approximately 8" thick.

Clayey soil.

5

CLAYEY GRAVEL (GC), grayish brown, moist, dense, well graded angular gravel, coarse sand.

SILTY SANDY GRAVEL (GM), brownish yellow, dry to slightly moist, medium dense, large diameter chert, sandstone, siltstone fragments.

10

Cobble.

Poor recovery

CLAYEY SANDY GRAVEL (GC), grayish brown, very moist to wet, dense, well graded, angular, fraction of dark brown sandstone.

15

Saturated.

BOTTOM OF BORING AT 19 FEET.

20

25

30

35

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/31/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 10, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▥ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

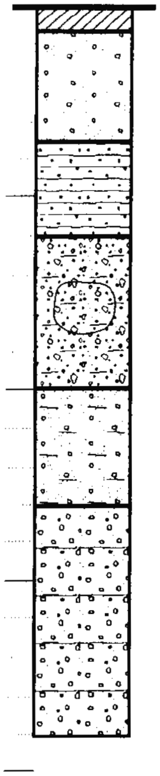
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

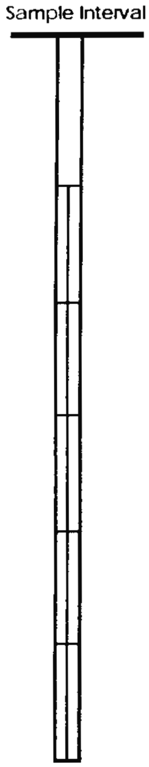
LITHOLOGY FOR 490-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT surface.
5		0.0	GRAVELLY CLAY (CL), brown with brownish yellowish and reddish brown, slightly moist to dry, very stiff.
		0.0	SILTY SANDY GRAVEL (GM), brownish gray, dry, medium dense, well graded, angular, fine sand to 4 centimeters gravel. COBBLES - light gray siltstone. SILTY SANDY GRAVEL (GM), brownish gray, moist, medium dense, fine, angular gravel, clasts to 1 centimeter.
10		0.0	SILTY GRAVELLY SAND (SM), grayish brown, moist, medium dense, medium grained, subrounded, sand.
			Dense, slightly moist.
15		0.0	CLAYEY SANDY GRAVEL (GC), dark yellowish brown to grayish brown with reddish brown, dark gray inclusions, very moist, dense, very well graded, subrounded to more than 5 centimeters.
			Highly weathered coarse inclusions of serpentinite, sandstone, and shale, olive-yellow to very dark gray in grayish brown matrix, wet.
			BOTTOM OF BORING AT 19 FEET.
20			
25			
30			
35			



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 9/30/01
STATE OF CALIFORNIA

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 10, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

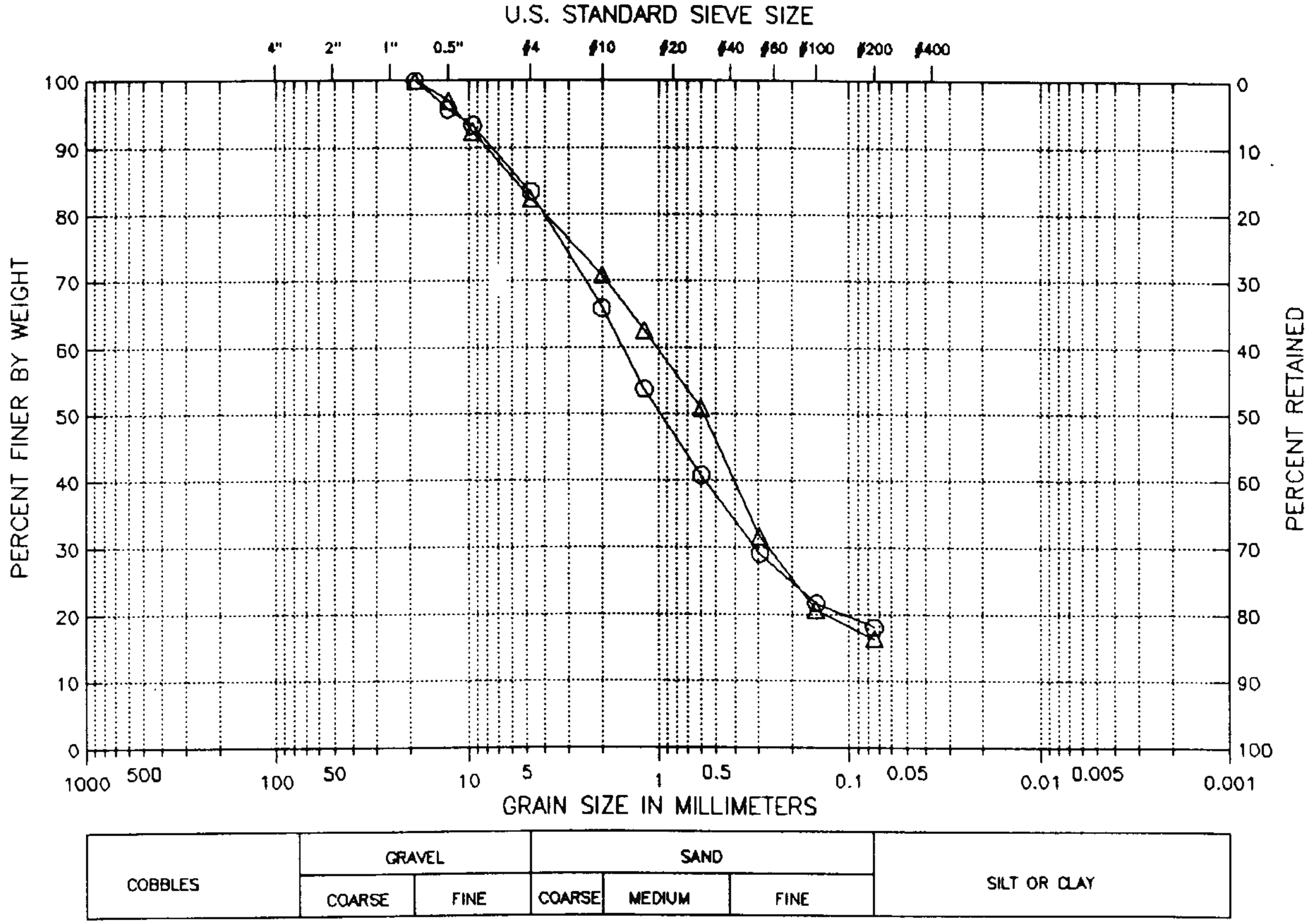
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 490-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998

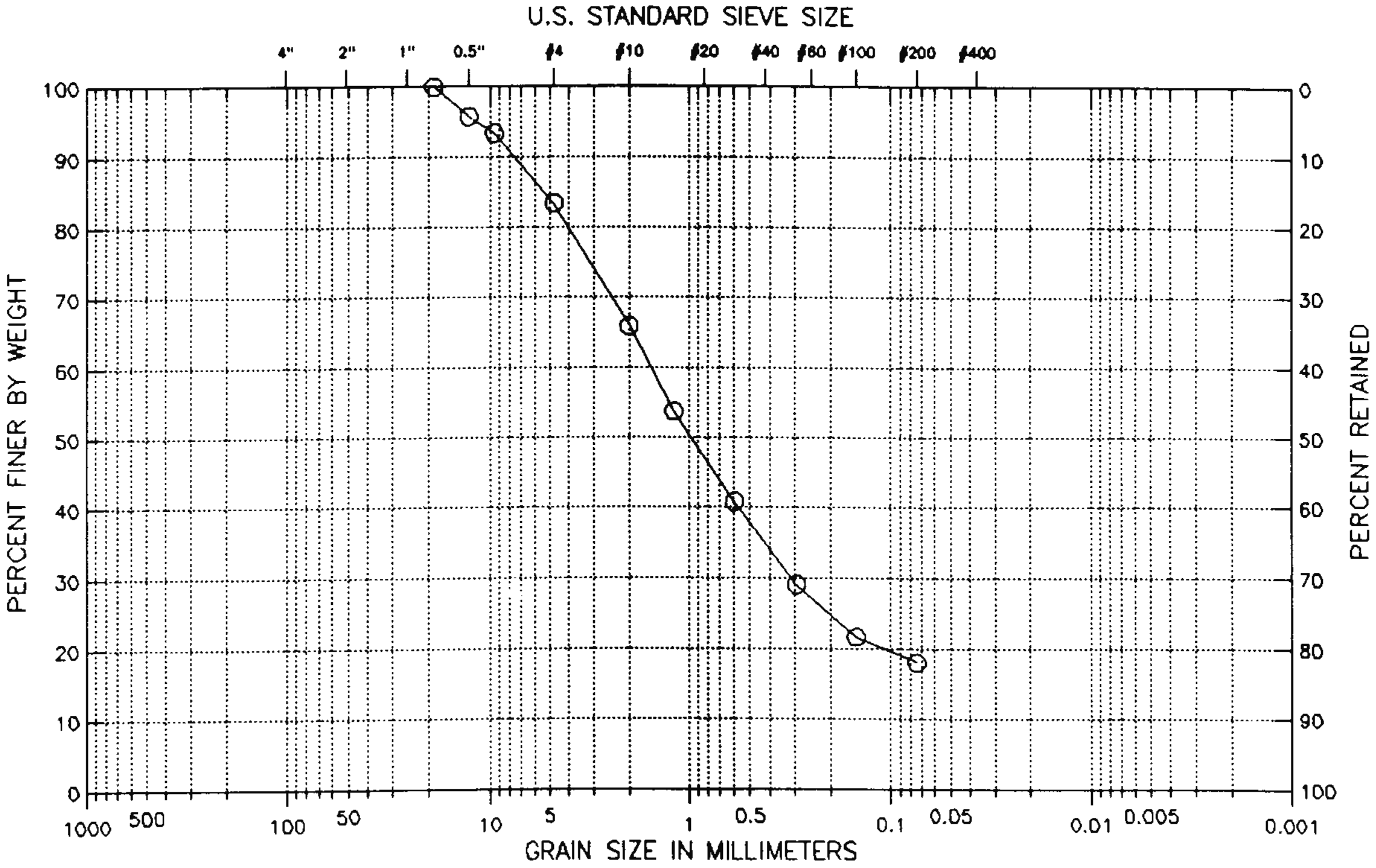


Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	490-BH-01	7.0-7.5 SV	7.0-7.5 FT.	490-07	BROWN GRAVELLY CLAYEY SAND
△	490-BH-06	23.0-23.5 SD	23.0-23.5 FT.	490-23	BROWN CLAYEY SAND WITH FINE GRAVEL

Figure 1

URS Greiner Woodward Clyde

Boring No. : 490-BH-01 Sample No.: 7.0-7.5 SV Tested by : C. WASON Filename : 490-07	Project : LEVINE FRICKE RECON 6730.00-024 Project No.: 16148A Location: SCVWD MTBE Date : Wed Dec 16 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN GRAVELLY CLAYEY SAND

Remarks :
Depth: 7.0-7.5 feet

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 490-07
Project No. : 16148A	Depth : 7.0-7.5 FT.	Elevation : NA
Boring No. : 490-BH-01	Test Date : 12/16/98	Tested by : C. WASON
Sample No. : 7.0-7.5 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN GRAVELLY CLAYEY SAND

Remarks : Depth: 7.0-7.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	9.23	9.23	96
0.375"	0.374	9.51	5.05	14.28	93
#4	0.187	4.75	21.66	35.94	83
#10	0.079	2.00	38.30	74.24	66
#16	0.047	1.19	26.31	100.55	54
#30	0.023	0.60	28.29	128.84	41
#50	0.012	0.30	25.42	154.26	29
#100	0.006	0.15	16.11	170.37	22
#200	0.003	0.07	7.96	178.33	18

Total Dry Weight of Sample = 217.7

D85 : 5.2774 mm
D60 : 1.5523 mm
D50 : 0.9710 mm
D30 : 0.3106 mm
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 490-BH-01
Sample No. : 7.0-7.5 SV
Location : SCVWD MTBE
Soil Description : BROWN GRAVELLY CLAYEY SAND
Remarks : Depth: 7.0-7.5 feet

Depth : 7.0-7.5 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 490-07
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

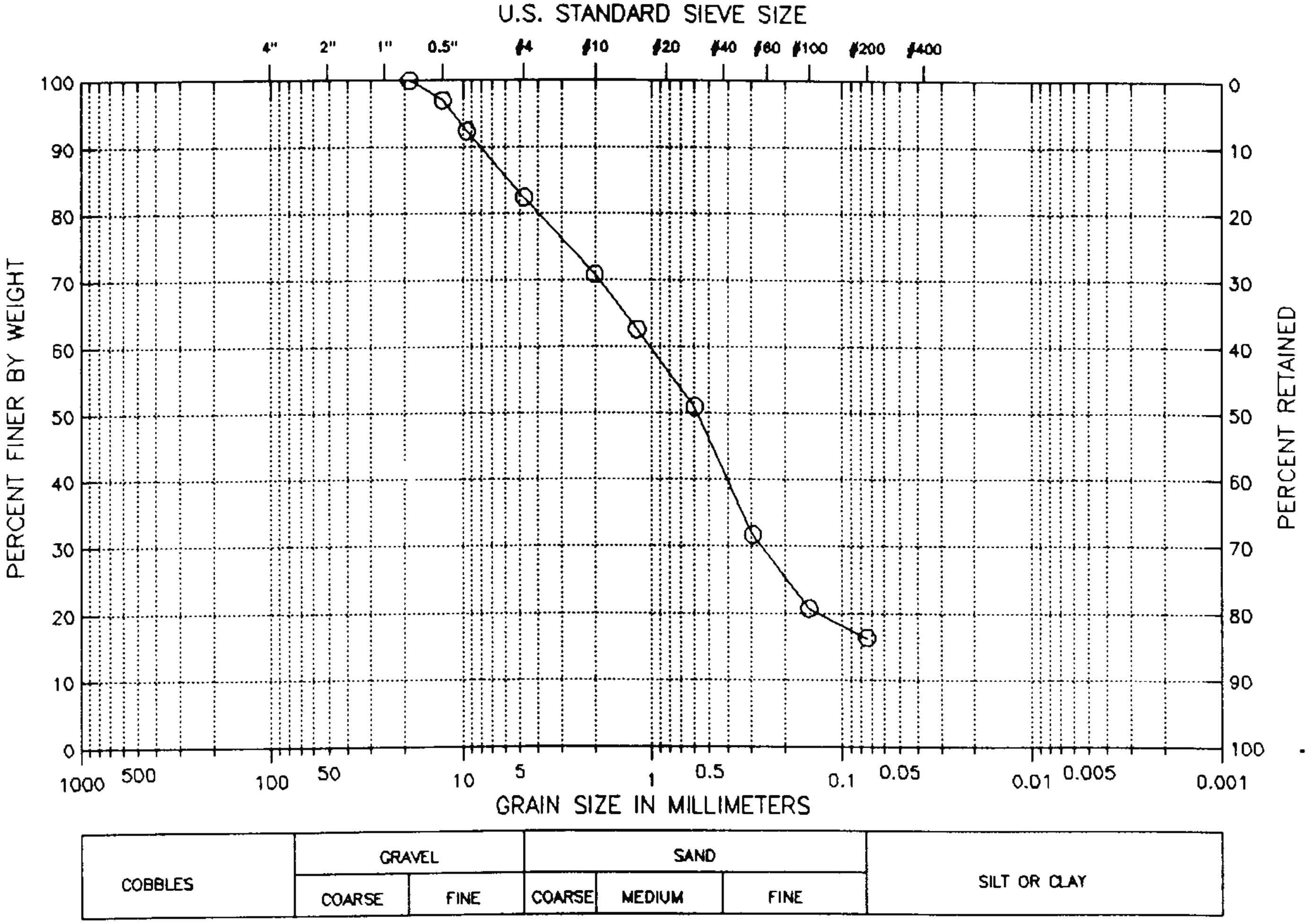
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	490-01-7	226.90	469.40	444.60	11.39

Average Moisture Content = 11.39

Boring No. : 490-BH-06
Sample No.: 23.0-23.5 SD
Tested by : C. WASON
Filename : 490-23

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
BROWN CLAYEY SAND WITH FINE GRAVEL

Remarks :
Depth: 23.0-23.5 feet

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 490-23
Project No. : 16148A
Depth : 23.0-23.5 FT.
Elevation : NA
Boring No. : 490-BH-06
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 23.0-23.5 SD
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN CLAYEY SAND WITH FINE GRAVEL
Remarks : Depth: 23.0-23.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	7.16	7.16	97
0.375"	0.374	9.51	11.10	18.26	93
#4	0.187	4.75	24.64	42.90	82
#10	0.079	2.00	28.28	71.18	71
#16	0.047	1.19	20.26	91.44	63
#30	0.023	0.60	28.41	119.85	51
#50	0.012	0.30	47.14	166.99	32
#100	0.006	0.15	26.66	193.65	21
#200	0.003	0.07	10.71	204.36	16

Total Dry Weight of Sample = 244.43

D85 : 5.6623 mm
D60 : 1.0197 mm
D50 : 0.5744 mm
D30 : 0.2655 mm
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

```
Wed Dec 16 10:35:51 1998                                                                      Page :  2

                                        GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                           Filename : 490-23
Project No. : 16148A            Depth : 23.0-23.5 FT.                Elevation : NA
Boring No. : 490-BH-06          Test Date : 12/16/98                 Tested by : C. WASON
Sample No. : 23.0-23.5 SD       Test Method : ASTM D422              Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN CLAYEY SAND WITH FINE GRAVEL
Remarks : Depth: 23.0-23.5 feet

                                        Natural Moisture Content
   Moisture Content    Mass of Container  Mass of Container  Mass of Container  Moisture Content
   ID                                     and Moist Soil     and Dried Soil
                             (gm)               (gm)               (gm)               (%)
   -----------------   -----------------  -----------------  -----------------  -----------------
1) 49006-23                       188.67             462.00             433.10             11.82

     Average Moisture Content = 11.82
```

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 505

Price/Costco
1601 Coleman Avenue
Santa Clara, California 9505C

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Santa Clara Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to depths of approximately 30 feet; sands and gravelly sands were encountered at 30 and 40 feet below ground surface; the shallowest depth to water was measured at approximately 13 feet (November 1998).

SYSTEM DESCRIPTION

The UST system at the site consists of three 20,000-gallon double-walled gasoline USTs constructed of 100% methanol compatible fiberglass reinforced plastic (FRP) and double-walled 100% FRP fiberglass piping. The UST system has a continuous interstitial monitoring leak detection system for the piping and USTs.

RESULTS

MtBE was detected in soil-gas, soil, and groundwater samples at this site. MtBE was detected in 10 the 23 soil-gas samples collected, at concentrations ranging from 1.2 µg/l to 68 µg/l. MtBE was detected in 12 of the 18 soil samples collected, at concentrations ranging from 12 µg/kg to 2,400 µg/kg. MtBE was detected in all 9 groundwater samples collected, at concentrations ranging from 0.57 µg/l to 25,000 µg/l. Petroleum hydrocarbons (benzene, toluene, ethylbenzene, and xylenes) were not detected in soil or groundwater samples collected at this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

None

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes, from monitoring system print out.
Date of last test:	Within 6 months of the inspection
Method of tank testing:	Automatic tank gauging
Tank leak rate (gallons/hour):	Test results invalidated due to product level increase.
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	Approximately 2 years
Years of operation as fueling facility:	Approximately 2 years
Estimated throughput:	Greater than 300,000 gallons per month
Monitoring systems operational?	
Systems operations, comment:	Performed functional test of liquid probes in dispenser pans.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes
Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	Not applicable
Personnel training:	Manned off-site.

Comments:

Tanks appeared to be in very good condition. Alarms for leak detection system are monitored off-site, as well as in store.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To north
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drain
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Several monitoring wells observed. Surface spills noted during customer dispensing. Very busy site.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1, 2, & 3

Date installed:	8/1/96
Tank capacity (gallons):	20,000 each
Tank contents:	Regular unleaded
Tank construction:	Premium unleaded
Type of system:	Double wall
Tank material (primary tank):	100% methanol compatible with fiberglass reinforced plastic
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground 100% methanol compatible, underground

Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #505
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
505-SG-01	11/16/98	5	<5	161	<1	<1	<1	<1	<1	
		13	<5	150	<1	1.2	<1	<1	<1	
		28	9.9	230	<1	<1	<1	<1	<1	
505-SG-01-SPL		28	1.2	NA	0.018	0.042	0.010 J	0.043	0.017	(a)
505-SG-02	11/16/98	5	<5	200	<1	<1	<1	<1	<1	
		13	5.8	170	<1	<1	<1	<1	<1	
		25	<5	<100	<1	<1	<1	<1	<1	
505-SG-02-DUP		25	<5	<100	<1	<1	<1	<1	<1	
505-SG-03	11/16/98	5	10	270	<1	1.1	<1	<1	<1	
		13	<5	<100	<1	<1	<1	<1	<1	
505-SG-04	11/16/98	5	<5	570	<1	<1	<1	<1	<1	
		13	<5	180	<1	<1	<1	<1	<1	
505-SG-05	11/17/98	5	24	300	<1	5.9	8.4	<1	<1	
		13	38	160	<1	2.7	<1	4.4	<1	
		28	61	310	<1	4.7	<1	<1	<1	
505-SG-05-DUP		28	68	350	<1	<1	<1	<1	<1	
505-SG-06	11/17/98	5	9.8	290	<1	<1	<1	<1	<1	
		13	6.0	<100	<1	<1	<1	<1	<1	
505-SG-07	11/17/98	5	<5	<100	<1	1.1	<1	<1	<1	
		13	<5	105	<1	1.5	<1	2	<1	
505-SG-08	11/17/98	5	<5	160	<1	<1	<1	<1	<1	
		13	<5	420	<1	<1	<1	<1	<1	
		28	<5	<100	<1	<1	<1	<1	<1	

Table proofed by _________.

Notes:

(a) Other analytes detected: Ethanol (0.057 ug/L), Methanol (0.25 ug/L) and Tertiary butyl alcohol (TBA) (0.046 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #505
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
505-BH-01	11/25/98	6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.0	2400	<1	<5	<5	<5	<5	<5	<20	<20	<20	1900
		23.5	1800	<1	<5	<5	<5	<5	<5	<20	<20	<20	1400
505-BH-02	11/24/98	6.0-6.5	340	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	970	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.0-23.5	15	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
505-BH-03	11/25/98	5.5	37	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0	18	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
505-BH-04	11/25/98	6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
505-BH-05	11/24/98	6.0-6.5	67	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.0-12.5	1400	<1	<5	<5	<5	<5	<5	<20	<20	<20	260
		22.0-22.5	12	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
505-BH-06	11/25/98	6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.5	430	<1	<5	<5	<5	<5	<5	<20	<20	<20	640
		20.0	260	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by _________.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 505
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
505-BH-01	11/25/98	25.0	25000	<13	<50	<50	<50	<50	<50	<100	<100	<100	12000
505-BH-02	11/24/98	20.0-25.0	220	<2.5	<10	<10	<10	<10	<10	<20	<20	<20	<200
		39.7-40.0	9.3	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
505-BH-02-DUP		39.7-40.0	8.8	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
505-BH-03	11/25/98	25.0	3.7	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
505-BH-04	11/25/98	25.0	0.57	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
505-BH-05	11/24/98	20.0-25.5	280	<0.5	<2	<2	<2	<2	<2	<4	<4	<4	<40
		35.0-37.0	620	<1.3	<5	<5	<5	<5	<5	<10	<10	<10	<100
505-BH-06	11/25/98	25.0	2300 J	<5	<20	<20	<20	<20	<20	<40	<40	<40	1100 J

Table proofed by _________.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 4
Summary of Physical Parameters for Soil Samples - Site #505
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
505-BH-02	10.0 - 10.5	Dark gray clay	0.28	41.73	112.5	79.4	52.86
	19.0 - 19.5	Light brown clay	0.08	36.72	112.3	82.2	51.2

Table proofed by _________.

Notes:

Specific gravity values were 2.70 for all samples analyzed.

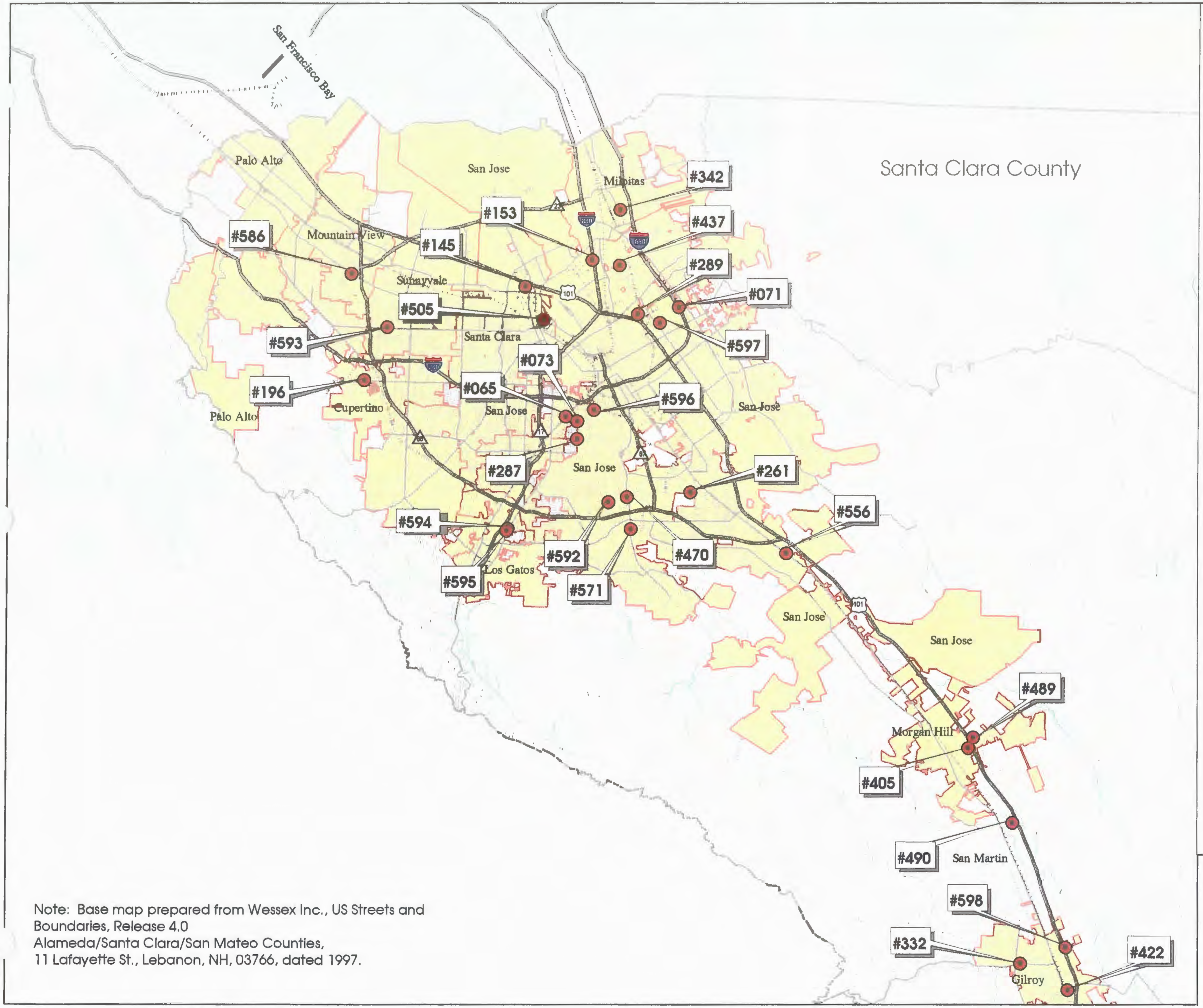
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.

All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.

ft bgs = feet below ground surface

lbs/cu.ft. = pounds per cubic foot

NA = Not analyzed



Legend

- ● Site Location
- 🟨 City within Santa Clara County
- Santa Clara County Boundary
- Rivers, Creeks, and Streams
- Freeway
- Principal Arterials
- Local Streets and Roads
- Railroad Lines

3 0 3 Miles

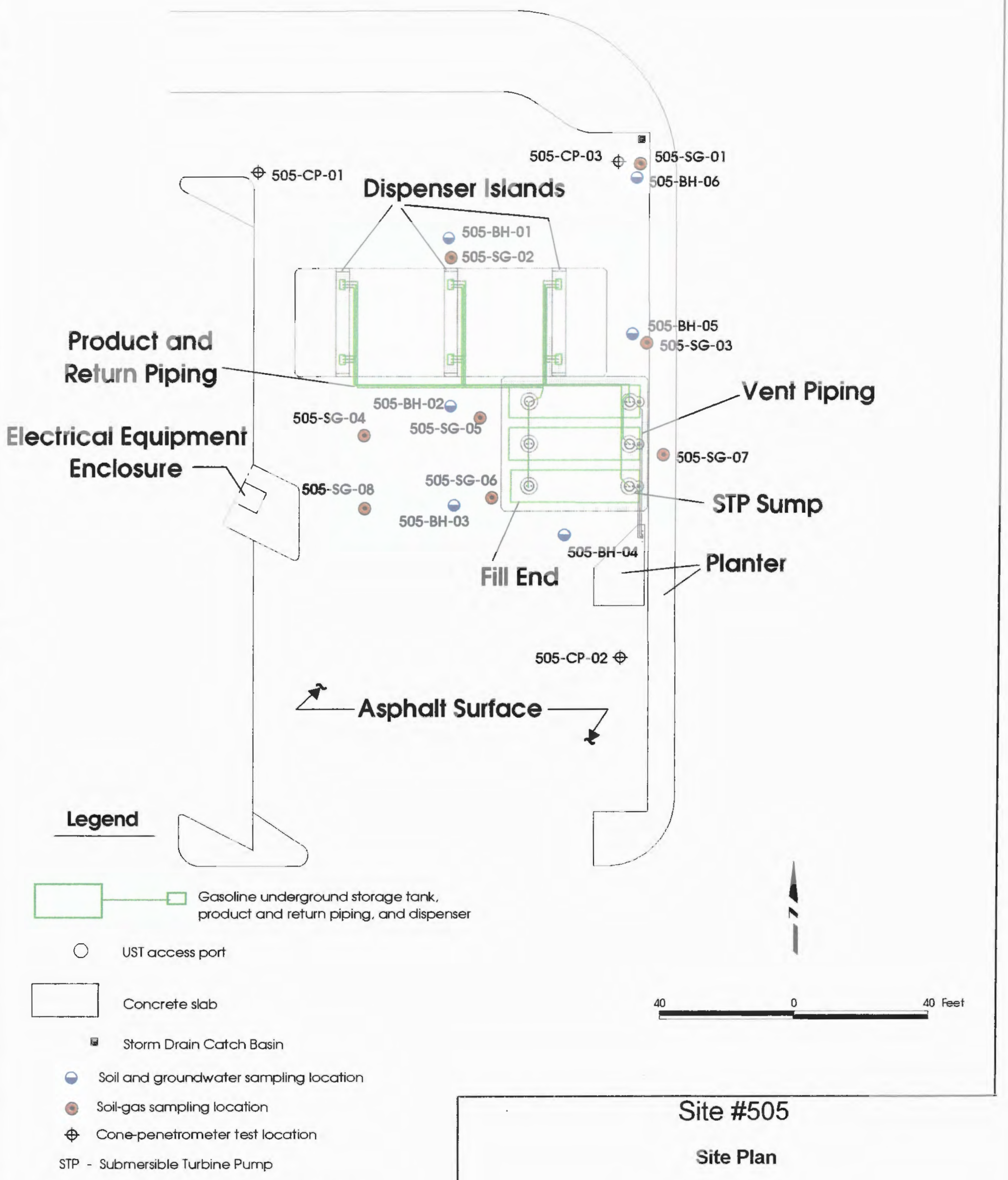
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Note: Base map prepared from Tank Locations and Piping Plan, sheet T-1, Price Costco, Santa Clara, CA, dated 6/5/96, and Hazardous Material Facility Map, Figure 1, Costco Warehouse, Santa Clara, CA, dated 7/2/96, both prepared by A.E. Schmidt Environmental, Inc., of Van Nuys, CA.

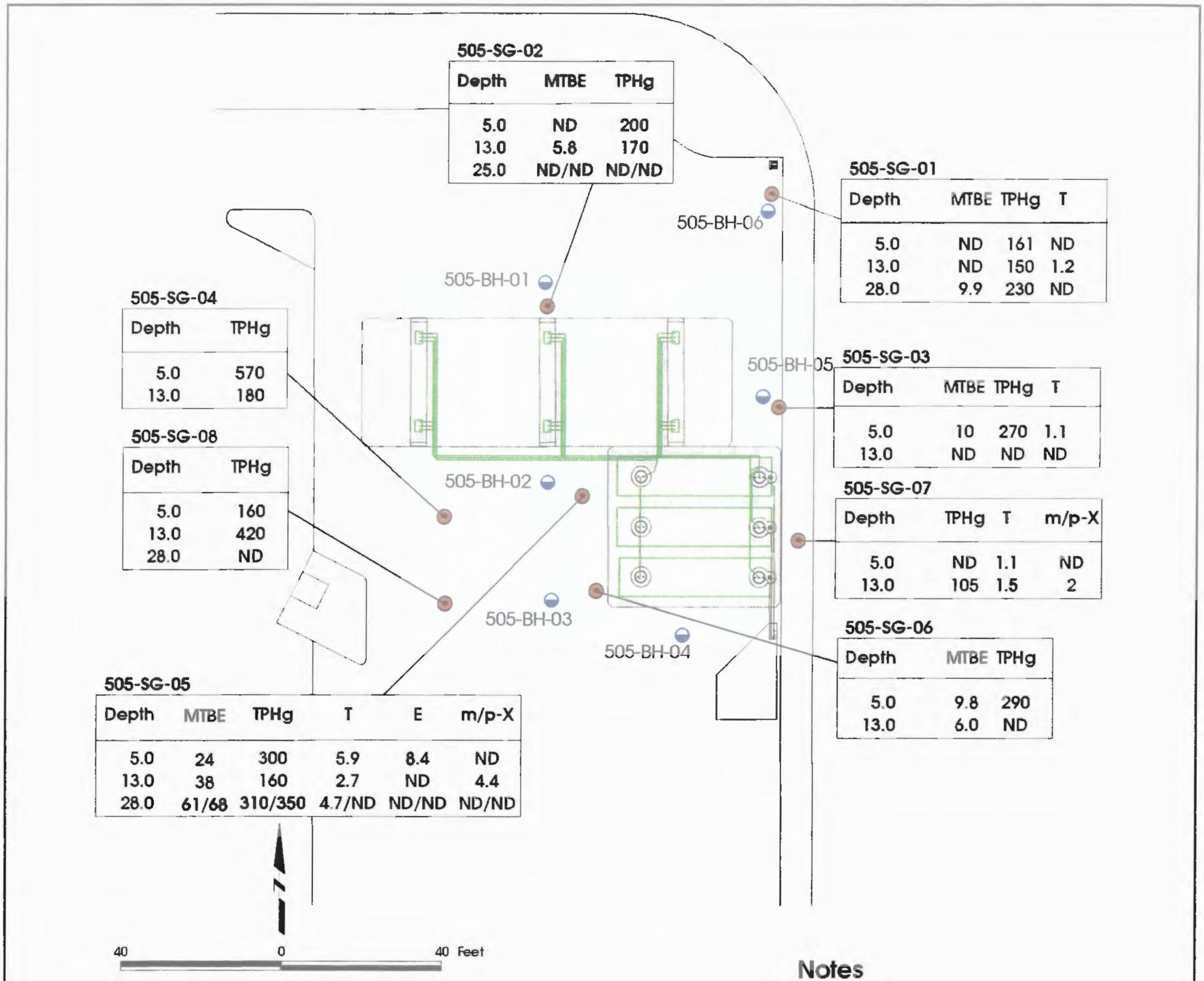
Site #505

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



505-SG-02

Depth	MTBE	TPHg
5.0	ND	200
13.0	5.8	170
25.0	ND/ND	ND/ND

505-SG-01

Depth	MTBE	TPHg	T
5.0	ND	161	ND
13.0	ND	150	1.2
28.0	9.9	230	ND

505-SG-04

Depth	TPHg
5.0	570
13.0	180

505-SG-03

Depth	MTBE	TPHg	T
5.0	10	270	1.1
13.0	ND	ND	ND

505-SG-08

Depth	TPHg
5.0	160
13.0	420
28.0	ND

505-SG-07

Depth	TPHg	T	m/p-X
5.0	ND	1.1	ND
13.0	105	1.5	2

505-SG-06

Depth	MTBE	TPHg
5.0	9.8	290
13.0	6.0	ND

505-SG-05

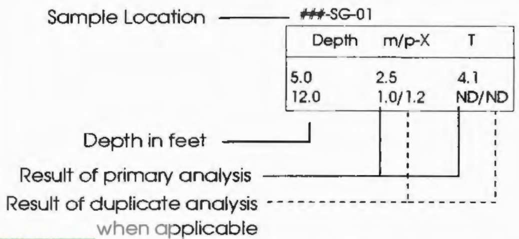
Depth	MTBE	TPHg	T	E	m/p-X
5.0	24	300	5.9	8.4	ND
13.0	38	160	2.7	ND	4.4
28.0	61/68	310/350	4.7/ND	ND/ND	ND/ND

Legend

● Soil-gas sampling location

◓ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▪ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

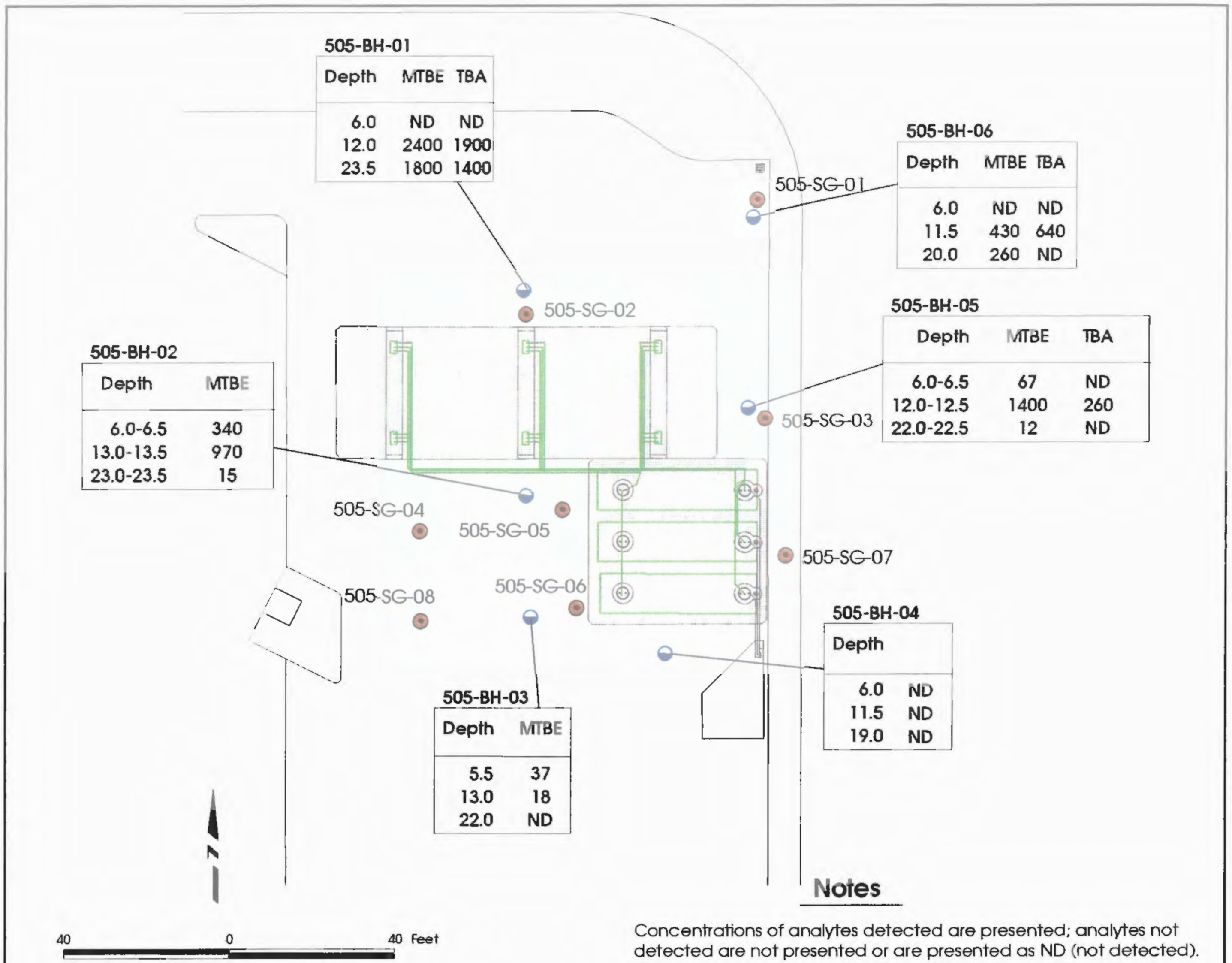
Site #505

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



505-BH-01

Depth	MTBE	TBA
6.0	ND	ND
12.0	2400	1900
23.5	1800	1400

505-BH-06

Depth	MTBE	TBA
6.0	ND	ND
11.5	430	640
20.0	260	ND

505-BH-05

Depth	MTBE	TBA
6.0-6.5	67	ND
12.0-12.5	1400	260
22.0-22.5	12	ND

505-BH-02

Depth	MTBE
6.0-6.5	340
13.0-13.5	970
23.0-23.5	15

505-BH-03

Depth	MTBE
5.5	37
13.0	18
22.0	ND

505-BH-04

Depth	
6.0	ND
11.5	ND
19.0	ND

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

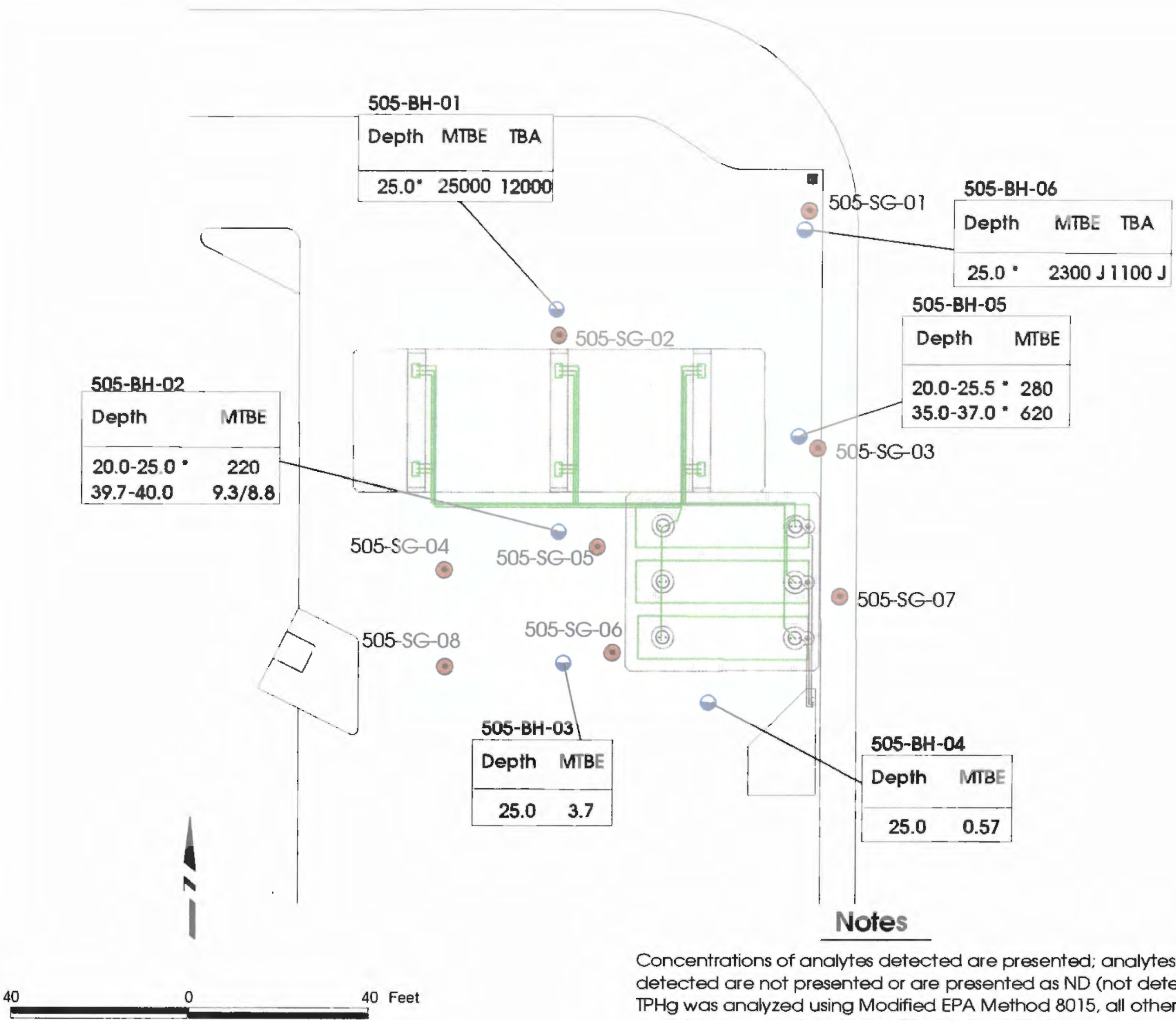
Site #505

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 4

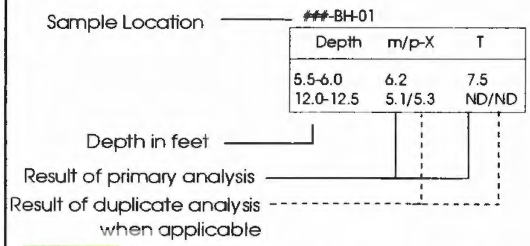


Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▪ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit
* Indicates elevated RL (see results table for reporting limits)
J = Estimated Value

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

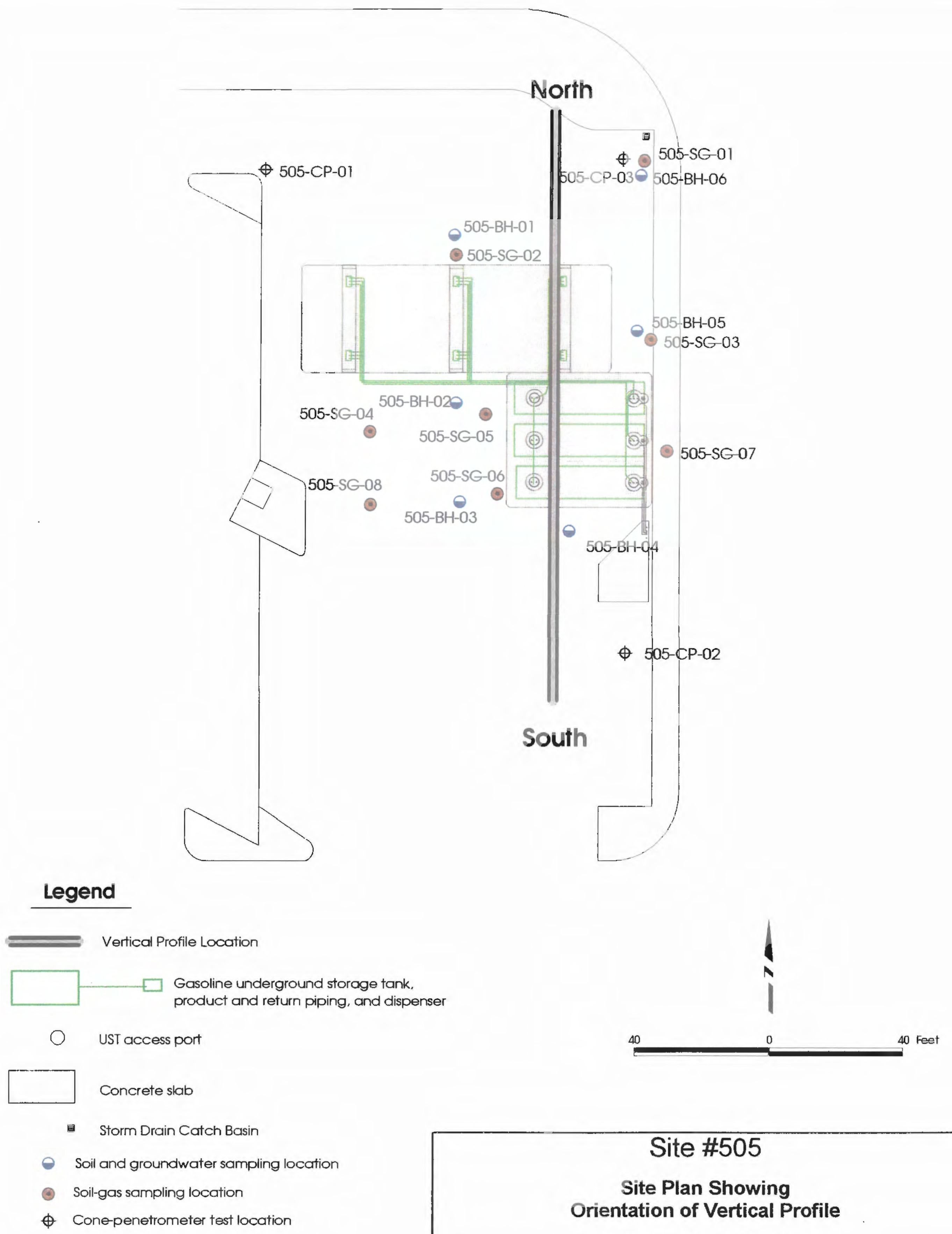
Site #505

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5



See Figure 2 for description of site features and origin of base map.

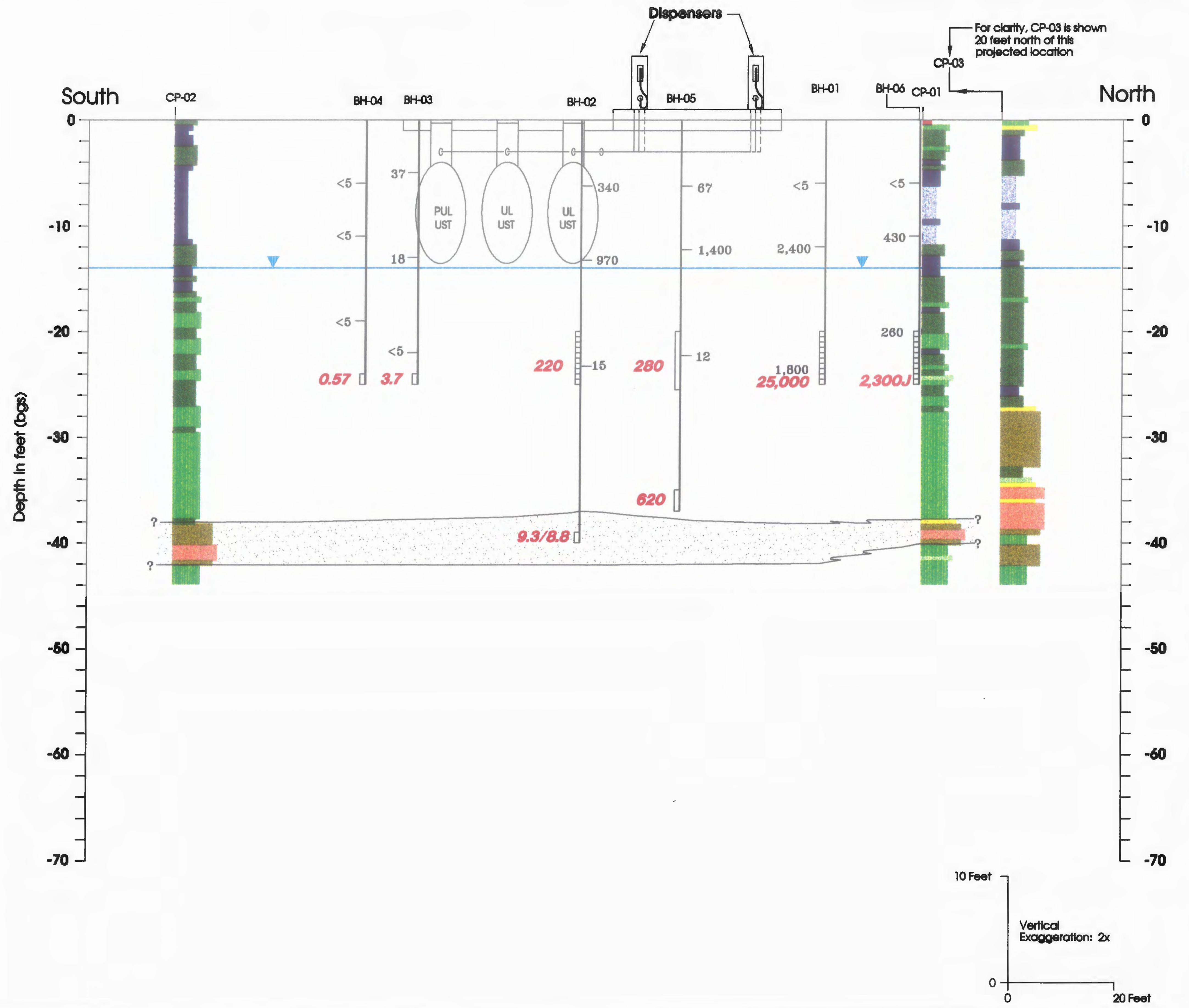
Site #505

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6



Legend and Abbreviations

260	Concentration of MTBE detected in soil Sample (µg/kg)
9.3/8.8	Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
J	Estimated value
▼	Shallowest measured depth to groundwater
———	Product piping
- - - - -	Vapor return piping
UL	Unleaded
PUL	Premium unleaded
UST	Underground storage tank
BH-01	Bore hole location
CP-01	Cone penetration test location

Bore hole

- Soil sample location
- Groundwater sample location
- Temporary monitoring well screen

▨	Laterally continuous saturated coarse-grained interval
🟦	Clay, Silty Clay
🟩	Silt, Clayey Silt
🟥	Sand, Gravelly Sand, Silty Sand

NOTE: All CPT and Bore hole locations are projected

Site #505

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 7

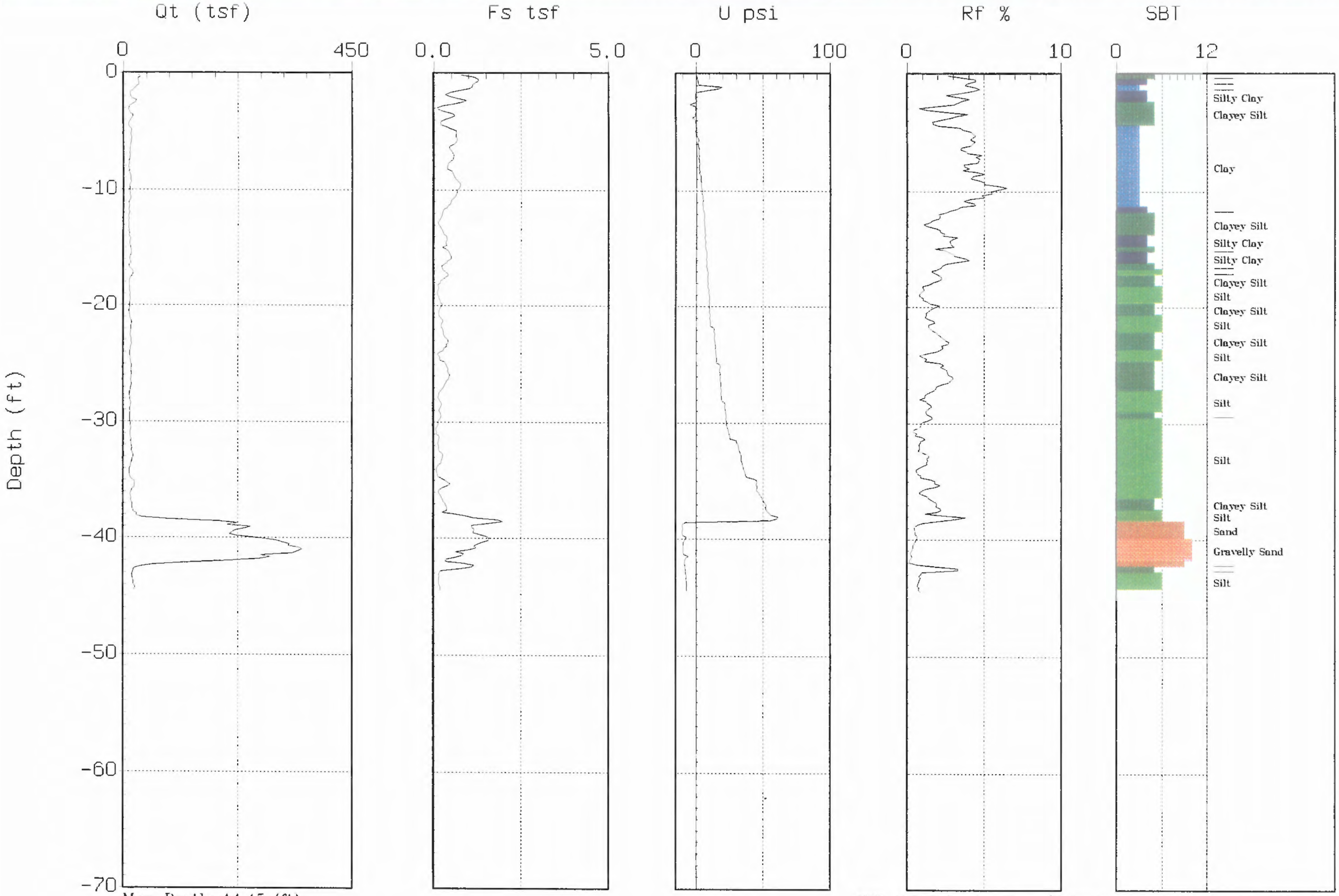
J:\ENGCAD\6730\CM#505.DWG 03/11/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: 505
Location : 505-CP-02

Geologist: Todd Miller
Date : 11:04:98 09:11



Max. Depth: 44.45 (ft)

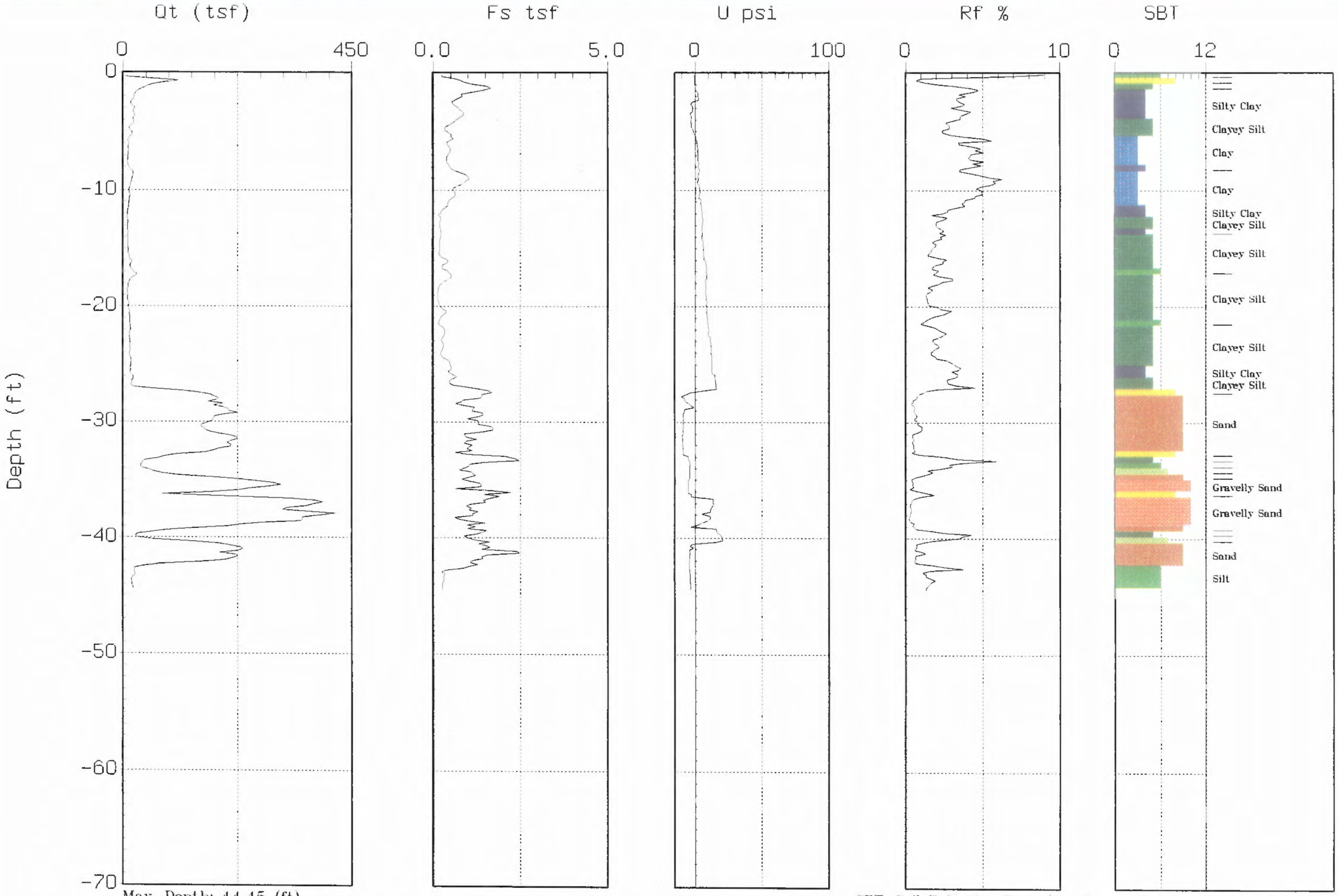
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 505
Location : 505-CP-03

Geologist: Todd Miller
Date : 11:04:98 10:07



Max. Depth: 44.45 (ft)

Depth Inc.: 0.164 (ft)

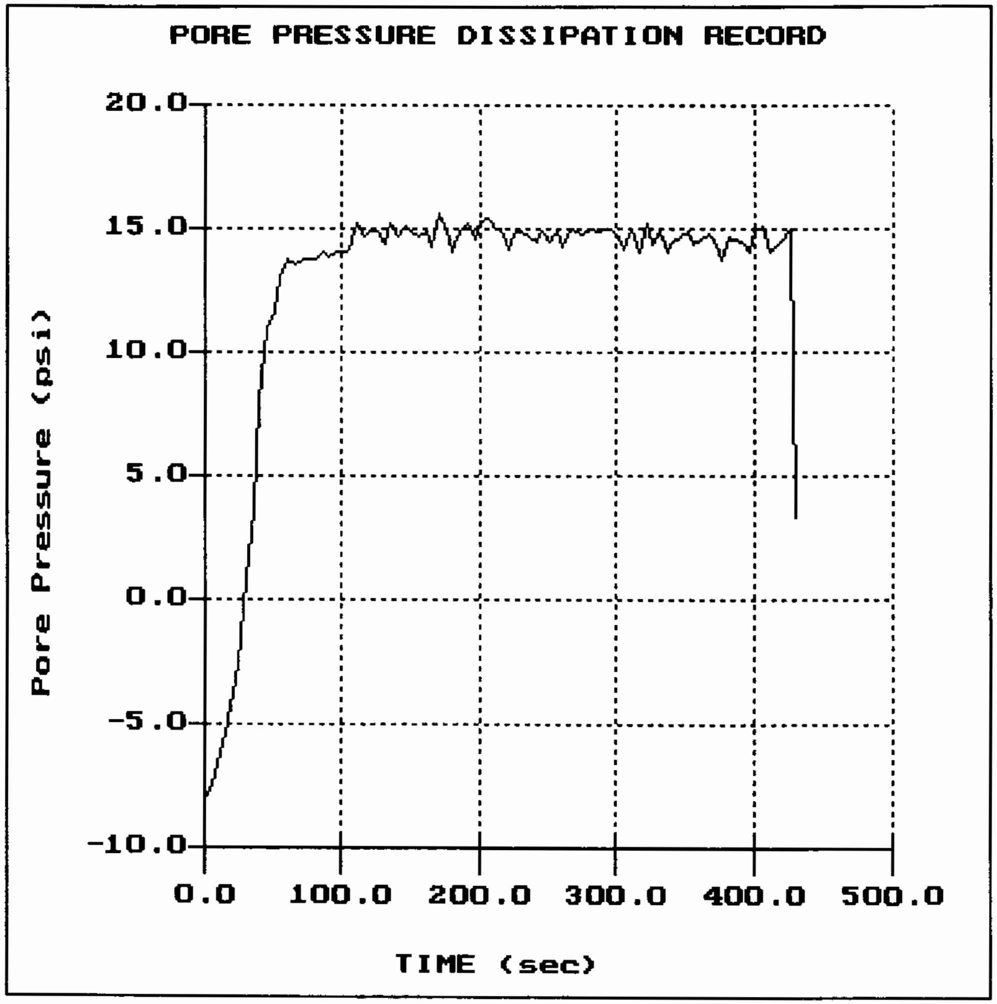
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:505-CP-01
Location:#505

Cone:20 TON AD071
Date:11:04:98 07:30

File: 108C09.PPR
Depth (m): 11.90
(ft): 39.04
Duration : 430.0s

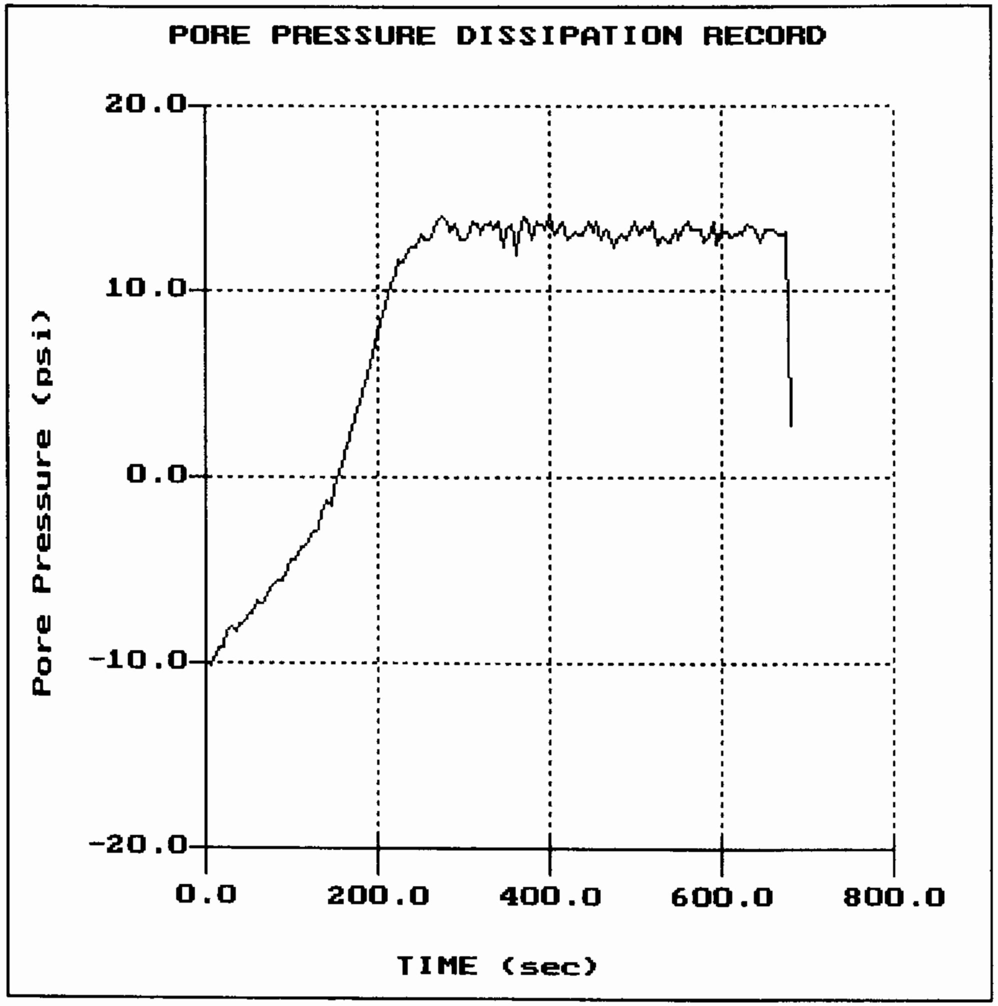


LFR LEVINE FRICKE

Hole:505-CP-02
Location:#505

Cone:20 TON AD071
Date:11:04:98 09:11

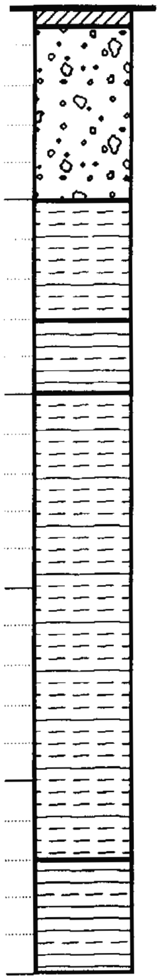
File: 108C10.PPR
Depth (m): 12.10
(ft): 39.70
Duration : 680.0s



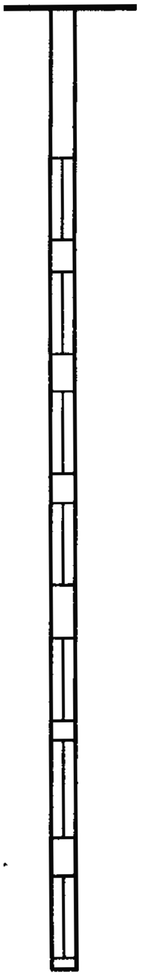
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT and Base rock.
		0.0	
5			
		0.0	CLAYEY SILT (ML), mottled olive-gray and brown, moist, medium plasticity, medium stiff.
		0.1	
		0.8	Grades to SILTY CLAY (CL), very dark gray, slightly moist, very low plasticity, stiff.
10		5.3	CLAYEY SILT (ML), mottled olive-brown and yellowish brown, very moist, moderate plasticity, very stiff.
		3.2	
		1.3	
		0.8	
15		9.3	CLAYEY SILT (ML), olive-gray, moist, very high plasticity, soft to medium stiff.
		0.5	Yellowish brown, slight mottling (10%), very moist, low plasticity, very soft.
		4.5	
			Wet.
20		0.1	Mottled olive-brown and olive-gray.
		4.5	
			SILTY CLAY (CL), mottled olive-gray and brown, moist, medium plasticity, soft to medium stiff.
		0.7	
			SILTY CLAY (CL), olive-gray, moist, very low plasticity, stiff.
25		4.8	BOTTOM OF BORING AT 25 FEET
30			
35			

Graphic Log



Sample Interval



JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 25, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
☰ Silt
▒ Sand
▓ Gravel

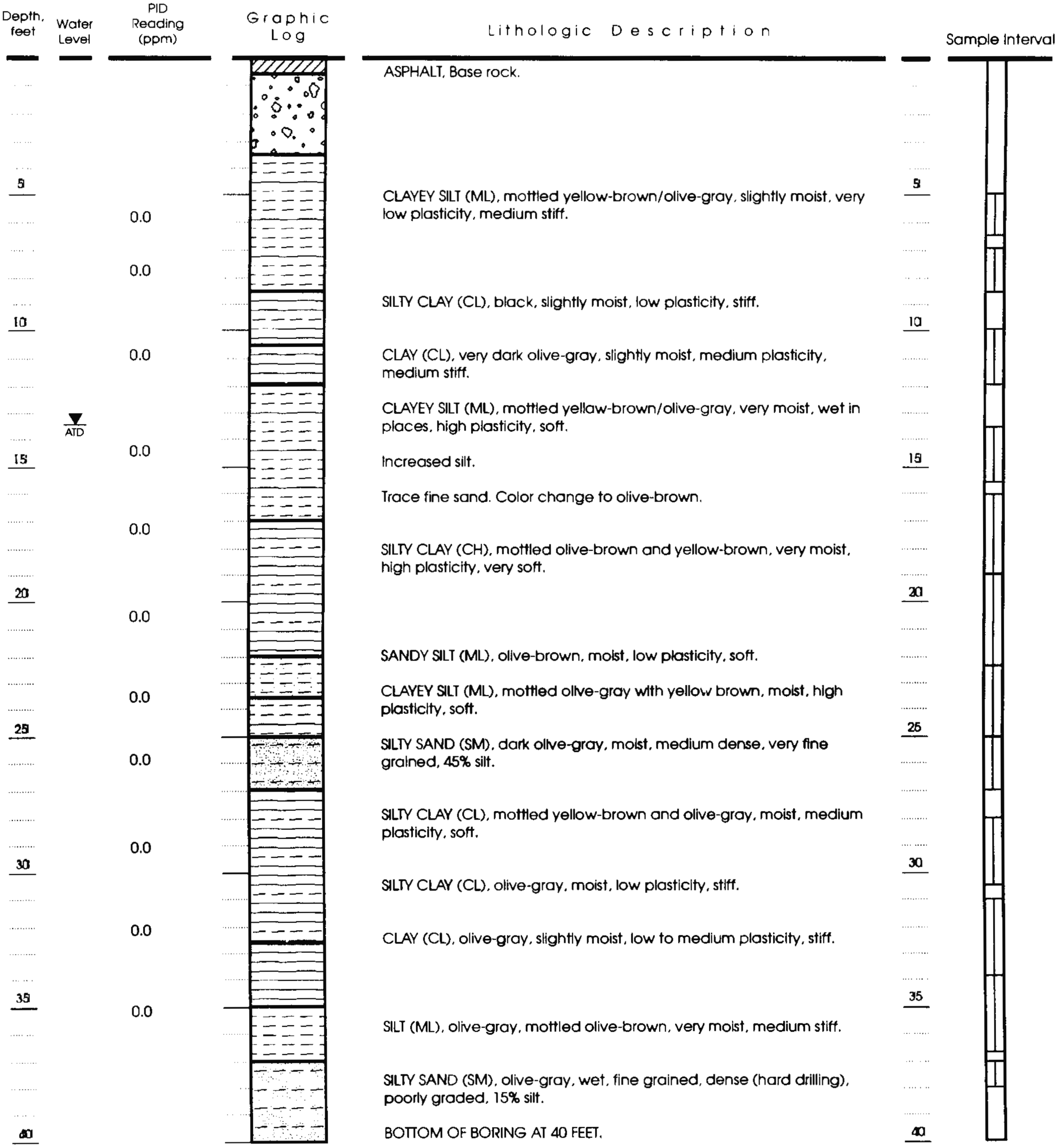
PID - Photoionization Detector

LFR LEVINE•FRICKE

LITHOLOGY FOR 505-BH-01 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



ASPHALT, Base rock.

CLAYEY SILT (ML), mottled yellow-brown/olive-gray, slightly moist, very low plasticity, medium stiff.

SILTY CLAY (CL), black, slightly moist, low plasticity, stiff.

CLAY (CL), very dark olive-gray, slightly moist, medium plasticity, medium stiff.

CLAYEY SILT (ML), mottled yellow-brown/olive-gray, very moist, wet in places, high plasticity, soft.

Increased silt.

Trace fine sand. Color change to olive-brown.

SILTY CLAY (CH), mottled olive-brown and yellow-brown, very moist, high plasticity, very soft.

SANDY SILT (ML), olive-brown, moist, low plasticity, soft.

CLAYEY SILT (ML), mottled olive-gray with yellow brown, moist, high plasticity, soft.

SILTY SAND (SM), dark olive-gray, moist, medium dense, very fine grained, 45% silt.

SILTY CLAY (CL), mottled yellow-brown and olive-gray, moist, medium plasticity, soft.

SILTY CLAY (CL), olive-gray, moist, low plasticity, stiff.

CLAY (CL), olive-gray, slightly moist, low to medium plasticity, stiff.

SILT (ML), olive-gray, mottled olive-brown, very moist, medium stiff.

SILTY SAND (SM), olive-gray, wet, fine grained, dense (hard drilling), poorly graded, 15% silt.

BOTTOM OF BORING AT 40 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	November 24, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

EXPLANATION

- ▤ Clay
- ▤ Silt
- ░ Sand
- ░ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

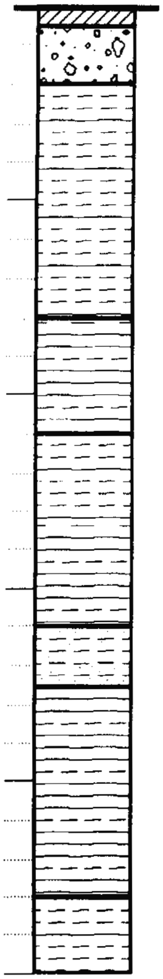
LFR
LEVINE•FRICKE

LITHOLOGY FOR 505-BH-02 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY

Graphic Log



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			SANDY GRAVEL, Engineered FILL.
			CLAYEY SILT (ML), gray-brown, slightly moist, medium plasticity, medium stiff.
5			
		0.0	
		0.8	
			SILTY CLAY (CL), very dark gray to black, slightly moist, medium plasticity, medium stiff to stiff.
10		0.2	
			CLAYEY SILT to SILTY CLAY (ML-CL), very dark gray-brown to dark grayish brown.
		0.2	
15			
		0.1	SANDY SILT (ML) interbed, very moist.
			SILTY CLAY (CL), brown, moist, medium plasticity, medium stiff.
		0.0	
20			Color mottled with gray.
		0.0	
			CLAYEY SILT (ML), dark bluish gray, moist, ~20% fine sand, medium plasticity, medium stiff.
25		0.0	BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval

No. 6650
Exp. 4/30/11

EXPLANATION
- Clay
- Silt
- Sand
- Gravel

PID - Photoionization Detector

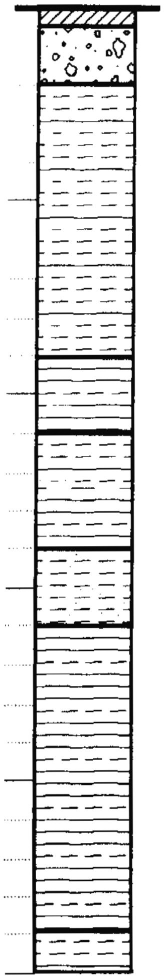
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 25, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 505-BH-03 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT Pavement. SANDY GRAVEL, Engineered FILL.	
			CLAYEY SILT (ML), dark brown, slightly moist, medium plasticity, medium stiff.	
5		0.0		5
		0.8	Color grades to dark gray-brown.	
10		0.2	SILTY CLAY (CL), very dark gray to black, slightly moist, medium plasticity, medium stiff.	10
		0.2	CLAYEY SILT - SILTY CLAY (ML-CL), dark brown to yellowish brown, slightly moist to moist, medium plasticity, medium stiff.	
15		0.1	SANDY SILT (ML) interbed, moist.	15
			SILTY CLAY (CL), yellow-brown mi ed with gray-brown, moist, medium plasticity, medium stiff.	
		0.0		
20				20
		0.0		
			CLAYEY SILT (ML), dark blue-gray, moist, medium plasticity, stiff, some fine sand, rootlets.	
25		0.0	BOTTOM OF BORING AT 25 FEET.	25
30				30
35				35

No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 25, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay
☰ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

LFR
LEVINE•FRICKE

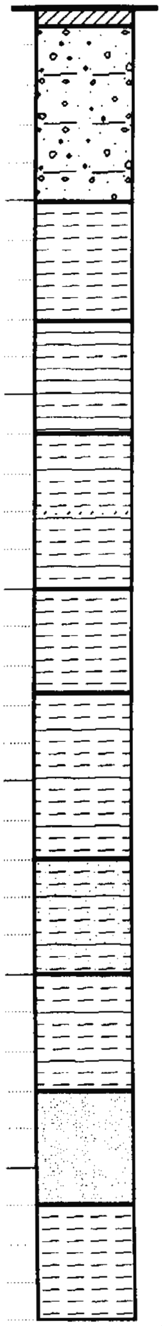
LITHOLOGY FOR 505-BH-04 *(page 1 of 1)*

Project No. 6730.00-030

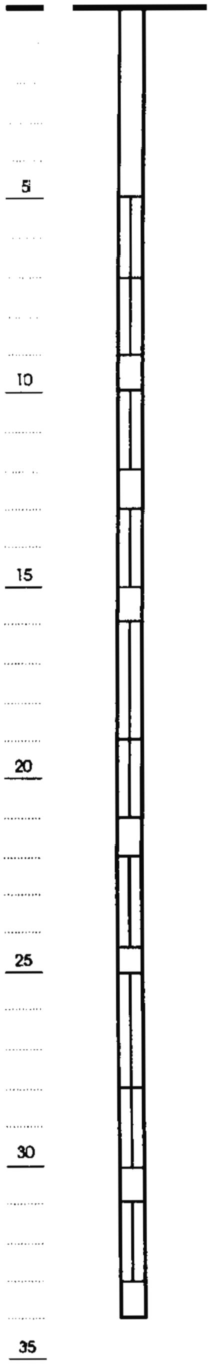
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Surface, Base rock.
			SILTY GRAVEL (GM), FILL material, olive-brown, slightly moist, loose.
5		0.0	SILT (ML), mottled olive-gray and yellowish brown, moist, very low plasticity, medium stiff, grades into
		0.0	SILTY CLAY (CL), olive-brown, moist, moderate plasticity, soft.
10		0.0	SILTY CLAY (CL), very dark gray, moist, medium plasticity, very stiff, veins of reddish brown. Possible root holes at 11 feet. CLAYEY SILT (ML), dark olive-gray, some mottling, moist, low plasticity, soft. Grades to olive-brown/yellow-brown, very soft, less clay, medium plasticity, thin organic zone - decayed roots at 13 feet.
		0.0	
15			SILT (ML), mottled yellowish brown and olive-brown, moist, very low plasticity, stiff.
		0.0	CLAYEY SILT (ML), mottled olive-brown and olive-gray, moist, medium plasticity, very soft.
20		0.1 0.5 0.9 0.0	
		0.0	CLAYEY SANDY SILT (ML), dark olive-brown, moist, very low plasticity, stiff.
25			CLAYEY SILT (ML), olive-brown, very moist, low plasticity, soft.
		0.0	
	▼ ATD	0.0	SAND (SP), grayish brown, wet, fine grained, dense, poorly graded.
30			
		0.0	SILT (ML), mottled olive-gray and olive-brown, moist, very low plasticity, stiff.
			BOTTOM OF BORING AT 34 FEET.
35			

Graphic Log



Sample Interval



JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
REGISTERED GEOLOGIST
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 24, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

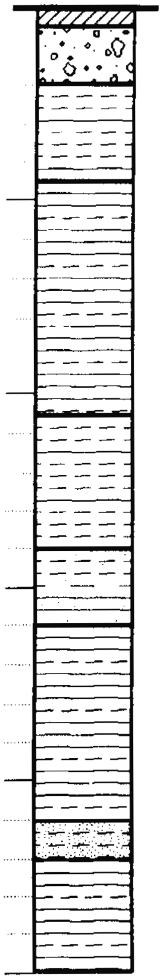
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 505-BH-05 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement. SANDY GRAVEL, Engineered FILL.
			CLAYEY SILT (ML), dark gray-brown, slightly moist, medium plasticity, medium stiff, trace of fine sand.
5			
		0.1	SILTY CLAY (CL), dark gray-brown, slightly moist, medium plasticity, medium stiff, trace of fine sand.
		0.2	
			Color grades to very dark gray. SILTY CLAY (CL), black, slightly moist, low plasticity, medium stiff to stiff.
10		1.6	
			CLAYEY SILT (ML), dark gray-brown to gray, mottled with yellow-brown.
		0.0	
15			SANDY SILT to SANDY CLAY (ML), dark yellow-brown to brown, moist, low plasticity, soft.
		0.4	
			SILTY CLAY (CL), yellow-brown to gray-brown, slightly moist to moist, stiff.
		0.2	
20			
			Sand and silt interbed.
		0.2	
			SILTY CLAY (CL), dark blue-gray, moist, medium plasticity, stiff, trace of fine sand.
25		0.0	BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval

No. 6650
Exp. 6/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 25, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

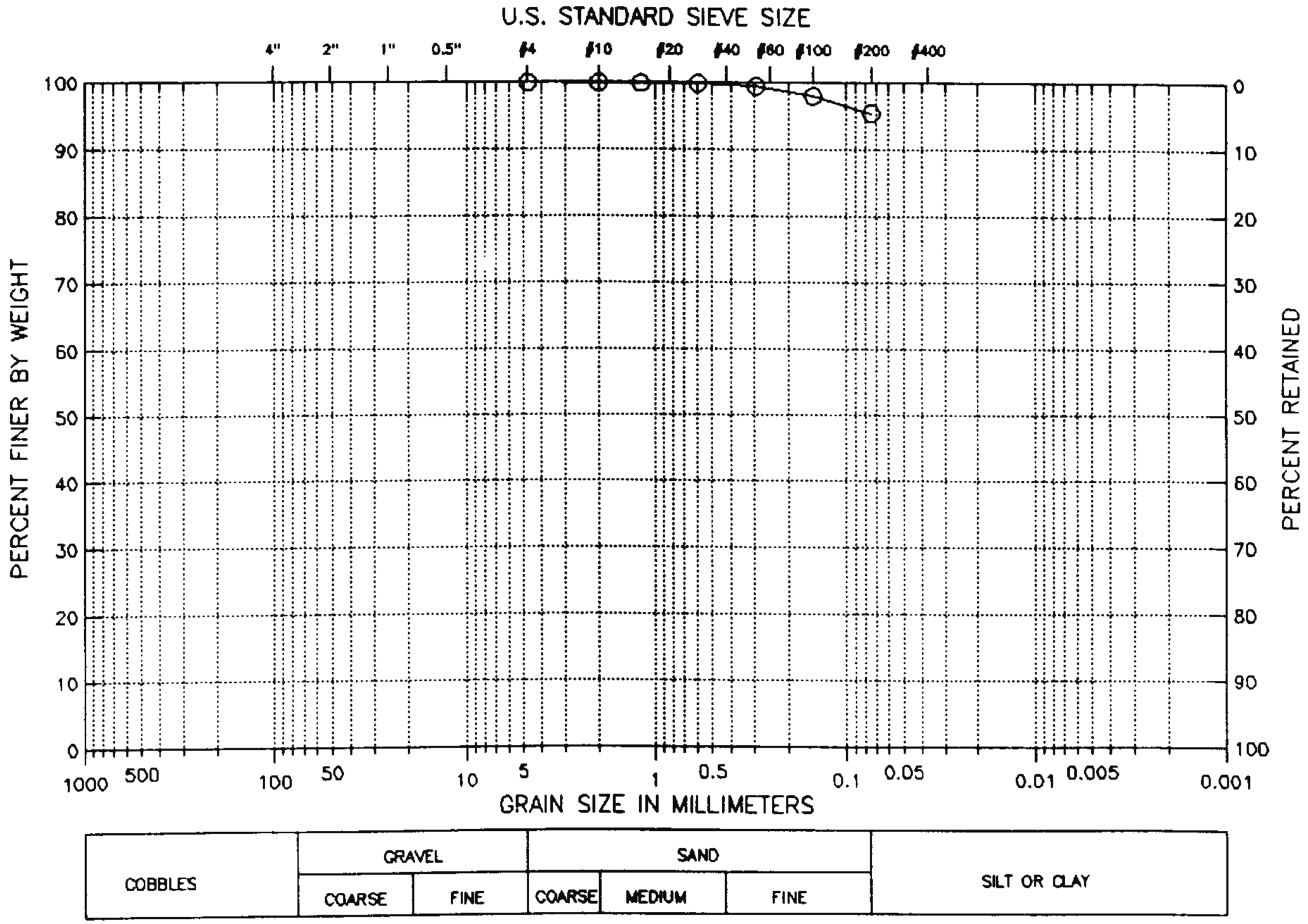
LFR
LEVINE•FRICKE

LITHOLOGY FOR 505-BH-06 *(page 1 of 1)*

Project No. 6730.00-030

Boring No. : 505-BH-02
Sample No: 10.0-10.5 SP
Tested by : C. WASON
Filename : 505-10

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
DARK GRAY CLAY

Remarks :
Depth: 10.0-10.5 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 16 11:16:42 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 505-BH-02
Sample No. : 10.0-10.5 SP
Location : SCVWD MTBE
Soil Description : DARK GRAY CLAY
Remarks : Depth: 10.0-10.5 feet

Depth : 10.0-10.5 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 505-10
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.02	0.02	100
#16	0.047	1.19	0.03	0.05	100
#30	0.023	0.60	0.08	0.13	100
#50	0.012	0.30	0.44	0.57	100
#100	0.006	0.15	1.87	2.44	98
#200	0.003	0.07	3.21	5.65	96

Total Dry Weight of Sample = 126.37

D85 : N/A
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Wed Dec 16 11:16:42 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 505-BH-02
Sample No. : 10.0-10.5 SP
Location : SCVWD MTBE
Soil Description : DARK GRAY CLAY
Remarks : Depth: 10.0-10.5 feet

Depth : 10.0-10.5 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 505-10
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

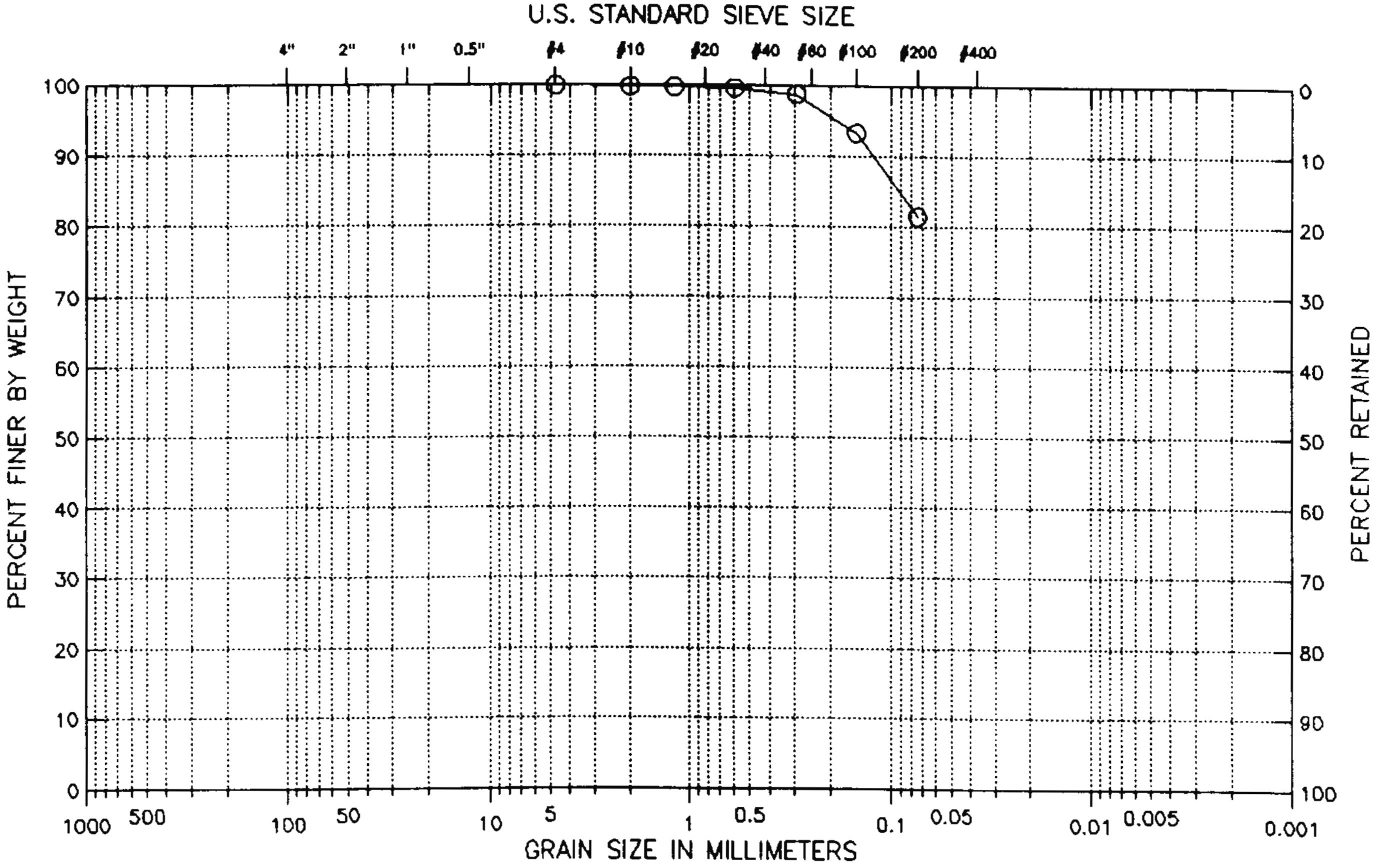
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	50502-10	188.09	367.20	314.46	41.73

Average Moisture Content = 41.73

Boring No. : 505–BH–02
Sample No.: 19.0–19.5 SP
Tested by : C. WASON
Filename : 505–19

Project : LEVINE FRICKE RECON 6730.00–024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
LT. BROWN CLAY WITH FINE SAND

Remarks :
Depth: 19.0–19.5 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 16 11:29:18 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 505-BH-02
Sample No. : 19.0-19.5 SP
Location : SCVWD MTBE
Soil Description : LT. BROWN CLAY WITH FINE SAND
Remarks : Depth: 19.0-19.5 feet

Depth : 19.0-19.5 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 505-19
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.21	0.21	100
#16	0.047	1.19	0.05	0.26	100
#30	0.023	0.60	0.23	0.49	100
#50	0.012	0.30	1.08	1.57	99
#100	0.006	0.15	7.57	9.14	93
#200	0.003	0.07	16.68	25.82	82

Total Dry Weight of Sample = 139.67

D85 : 0.0908 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

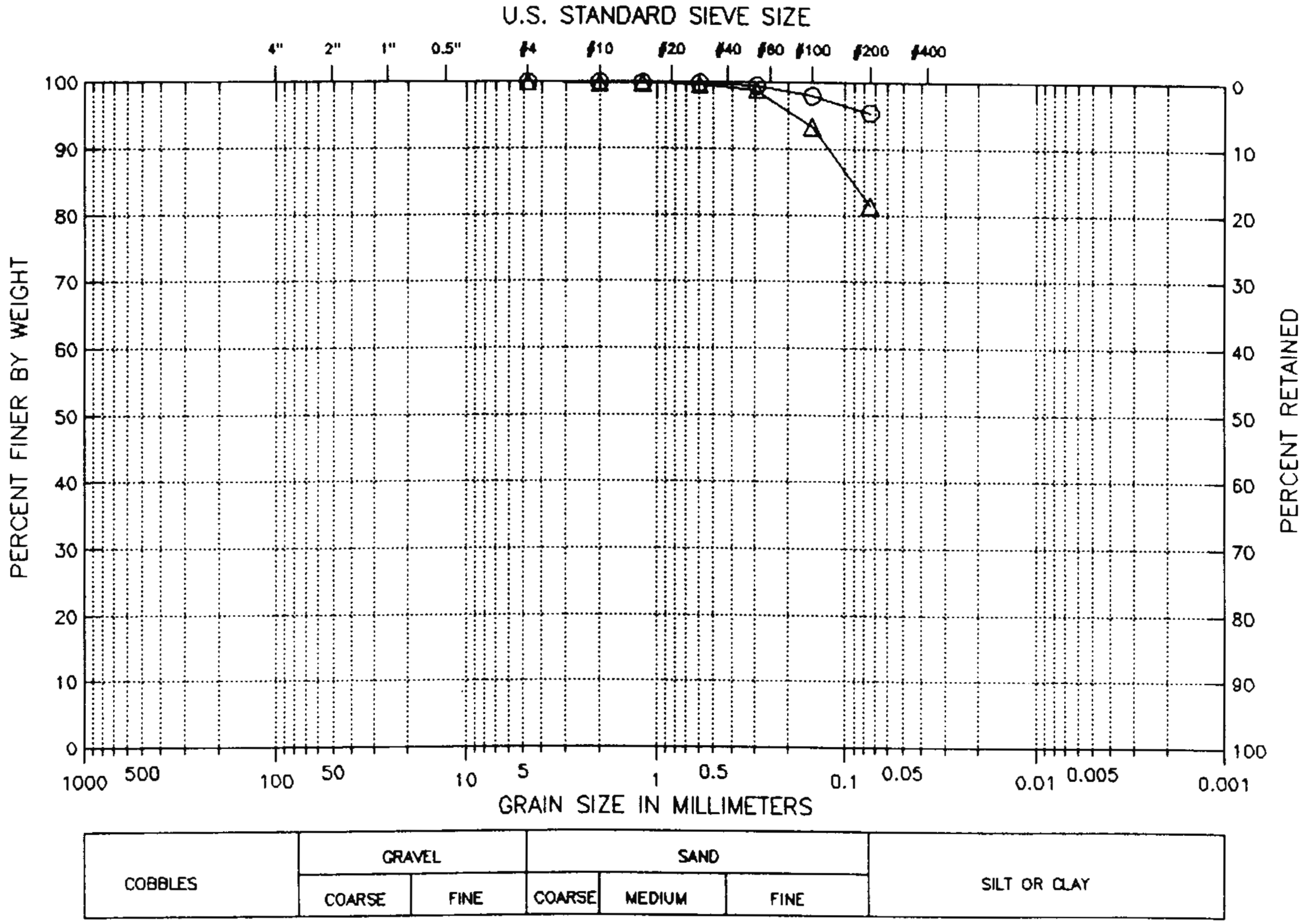
Project : LEVINE FRICKE RECON 6730.00-024
Filename : 505-19
Project No. : 16148A
Depth : 19.0-19.5 FT.
Elevation : NA
Boring No. : 505-BH-02
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 19.0-19.5 SP
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : LT. BROWN CLAY WITH FINE SAND
Remarks : Depth: 19.0-19.5 feet

Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	505-19	220.34	411.30	360.01	36.72

Average Moisture Content = 36.72

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	505-BH-02	10.0-10.5 SP	10.0-10.5 FT.	505-10	DARK GRAY CLAY
△	505-BH-02	19.0-19.5 SP	19.0-19.5 FT.	505-19	LT. BROWN CLAY WITH FINE SAND

Figure 1

URS Greiner Woodward Clyde

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 556

USA Petroleum Station
6050 Monterey Highway
San Jose, California 95138

April 30, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the San Jose Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of clays to approximately 60 feet below ground surface (bgs). A 3 to 5 feet thick sand layer was encountered at approximately 25 feet bgs. Sands and gravels were encountered at approximately 35 to 40 feet bgs in three of the borings. The shallowest depth to groundwater measured was approximately 20 feet bgs.

SYSTEM DESCRIPTION

The UST system at the site consists of three 12,000-gallon double-walled gasoline USTs constructed of steel clad with fiberglass reinforced plastic, and double-walled geoflex piping. One of the USTs is a split tank containing diesel and premium unleaded gasoline. The UST system utilizes continuous interstitial monitoring for piping leak detection and continuous interstitial monitoring and automatic tank gauging for the UST leak detection. Field observations indicate UST system utilizes an assisted vapor recovery system.

RESULTS

No MtBE or petroleum hydrocarbons were detected in soil or groundwater samples collected from soil borings drilled adjacent to the site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

This is a new gas station. Tanks installed in 1997.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1

Date installed:	7/97
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2

Date installed:	7/97
Tank capacity (gallons):	12,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3

Date installed:	7/97
Tank capacity (gallons):	6,000 (split 12,000)
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 4

Date installed:	7/97
Tank capacity (gallons):	6,000 (split 12,000)
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

Table 1

Summary of Chemical Analysis Results for Soil Samples - Site #556

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
556-BH-01	02/22/99	12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.0-25.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.0-28.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
556-BH-02	02/23/99	12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.0-21.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.0-28.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
556-BH-03	02/24/99	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.5-29.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		38.5-39.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
556-BH-04	02/24/99	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.0-28.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
556-BH-05	02/25/99	8.0-8.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.0-23.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.5-29.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 556
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
556-BH-01	02/25/99	23.0-43.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
556-BH-01-DUP		23.0-43.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
556-BH-03	02/24/99	20.0-40.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
556-BH-04	02/24/99	23.0-43.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
556-BH-05	02/25/99	32.0-52.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

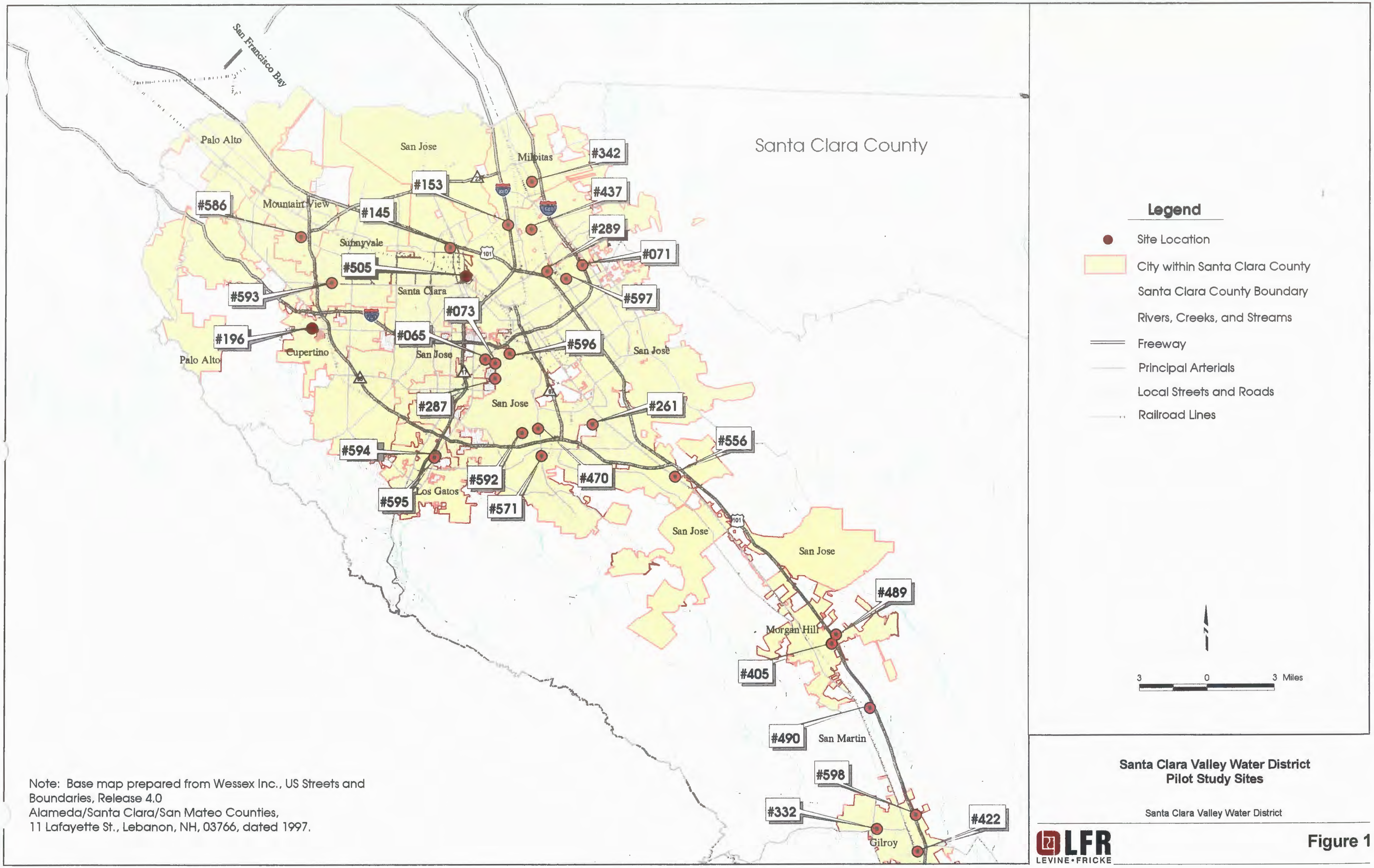
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



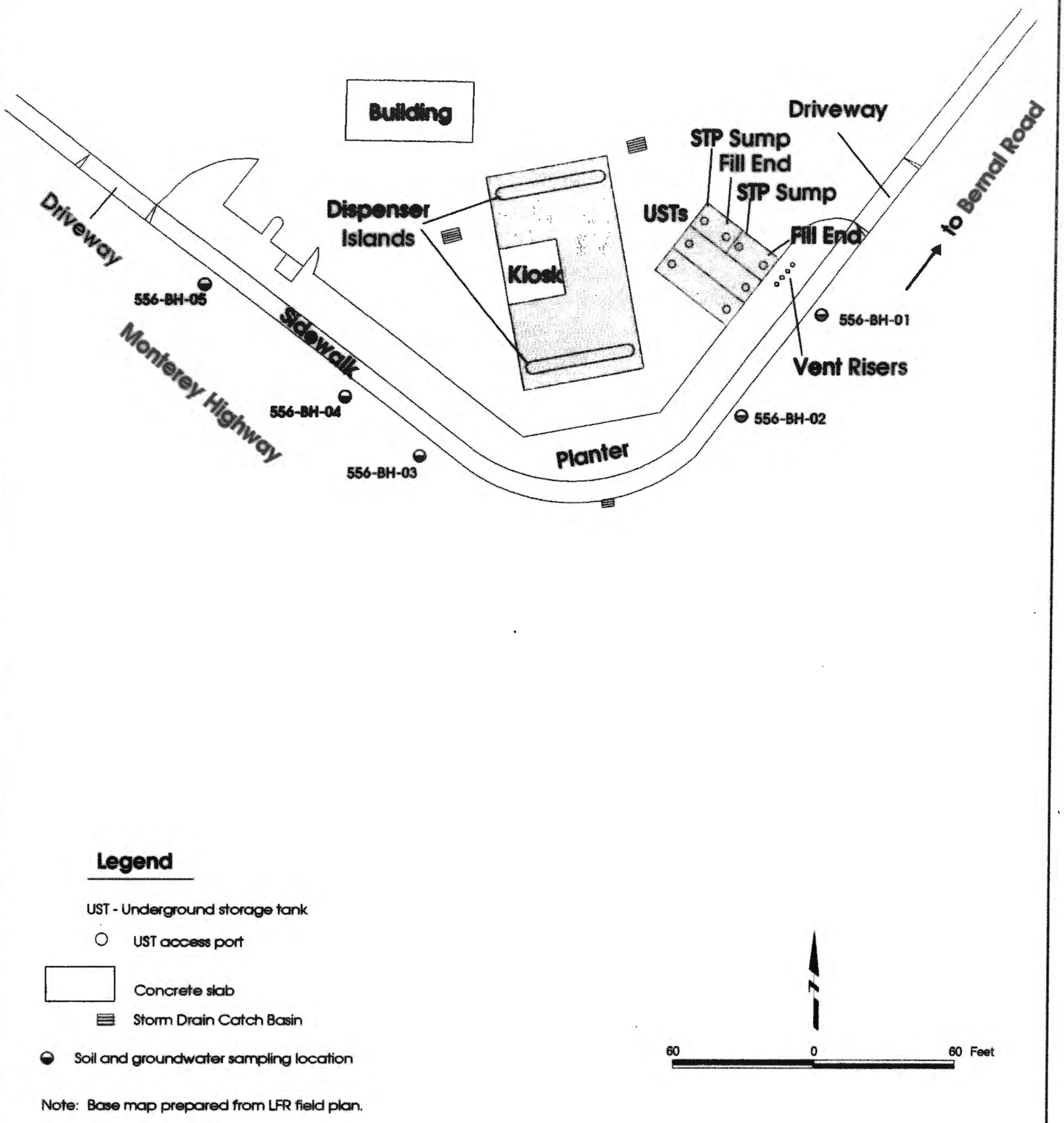
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Site #556

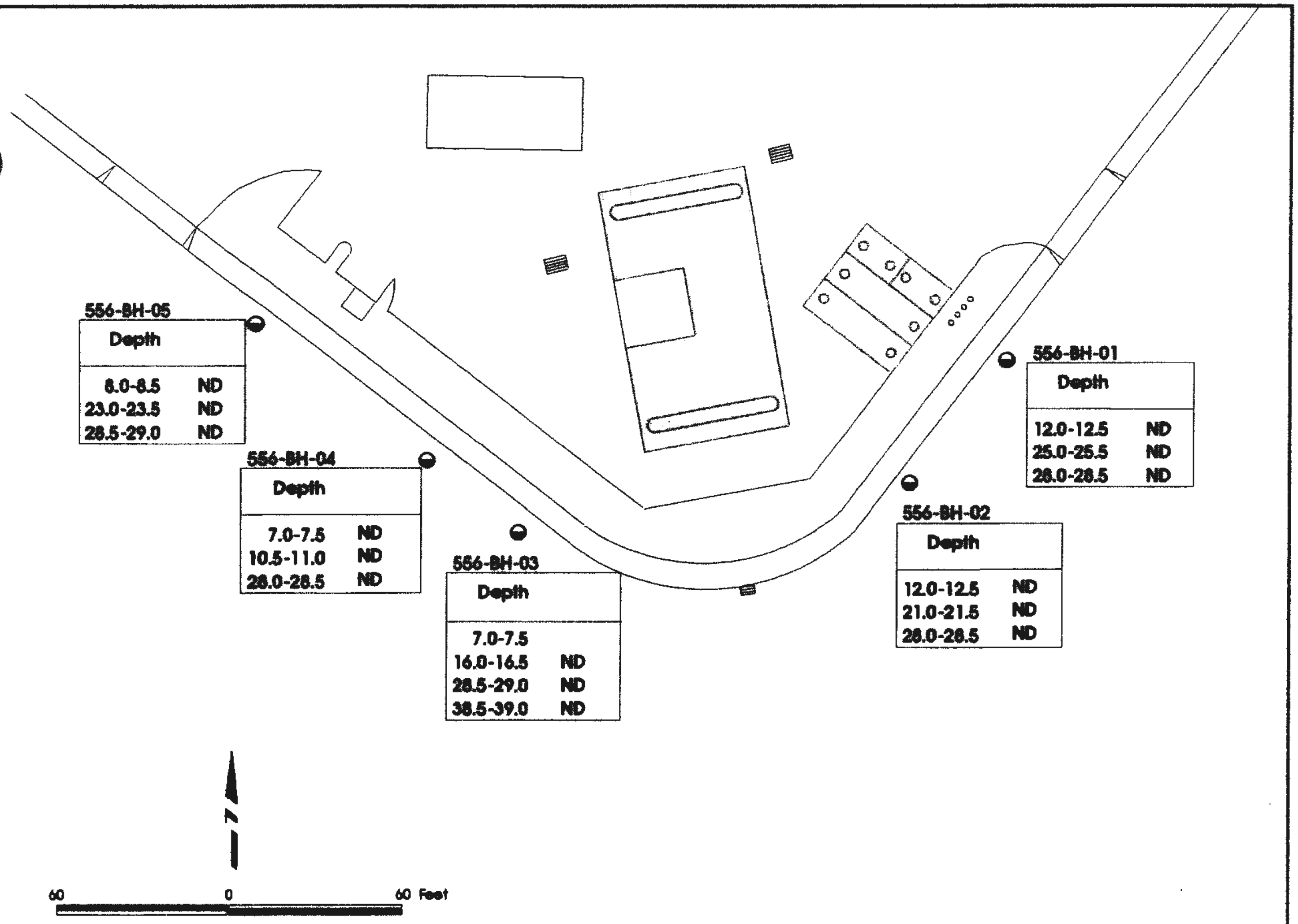
Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2

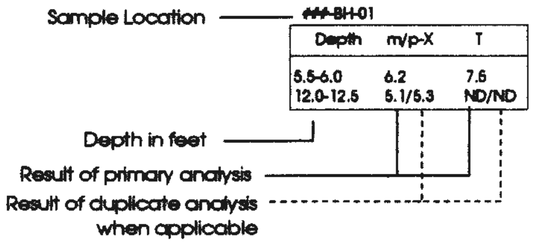
u:/scvwd/gis/556.apr



Legend

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

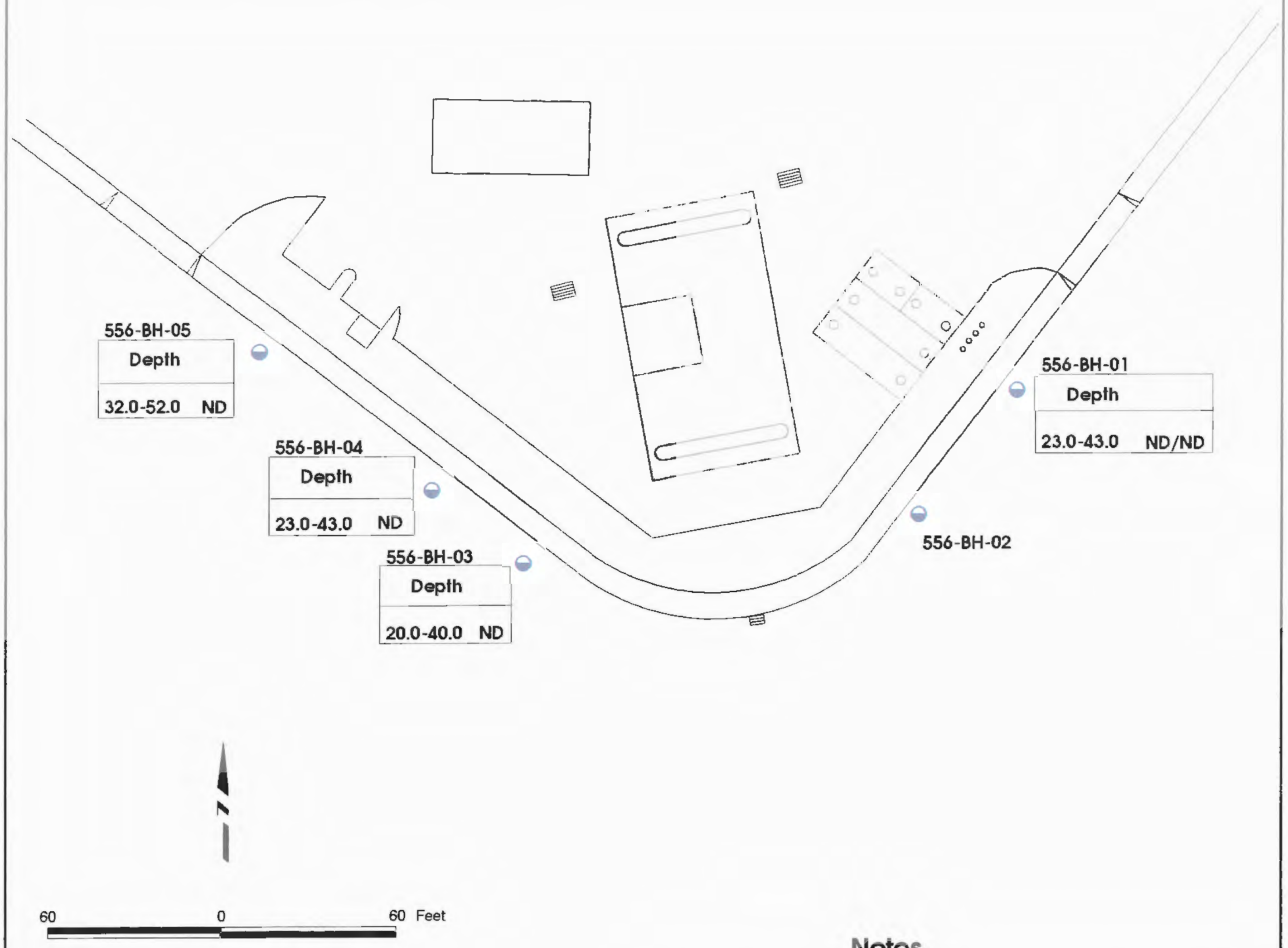
Site #556

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

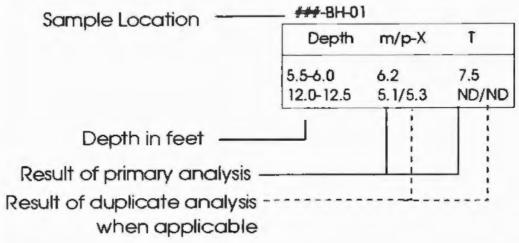
Figure 3



Legend

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

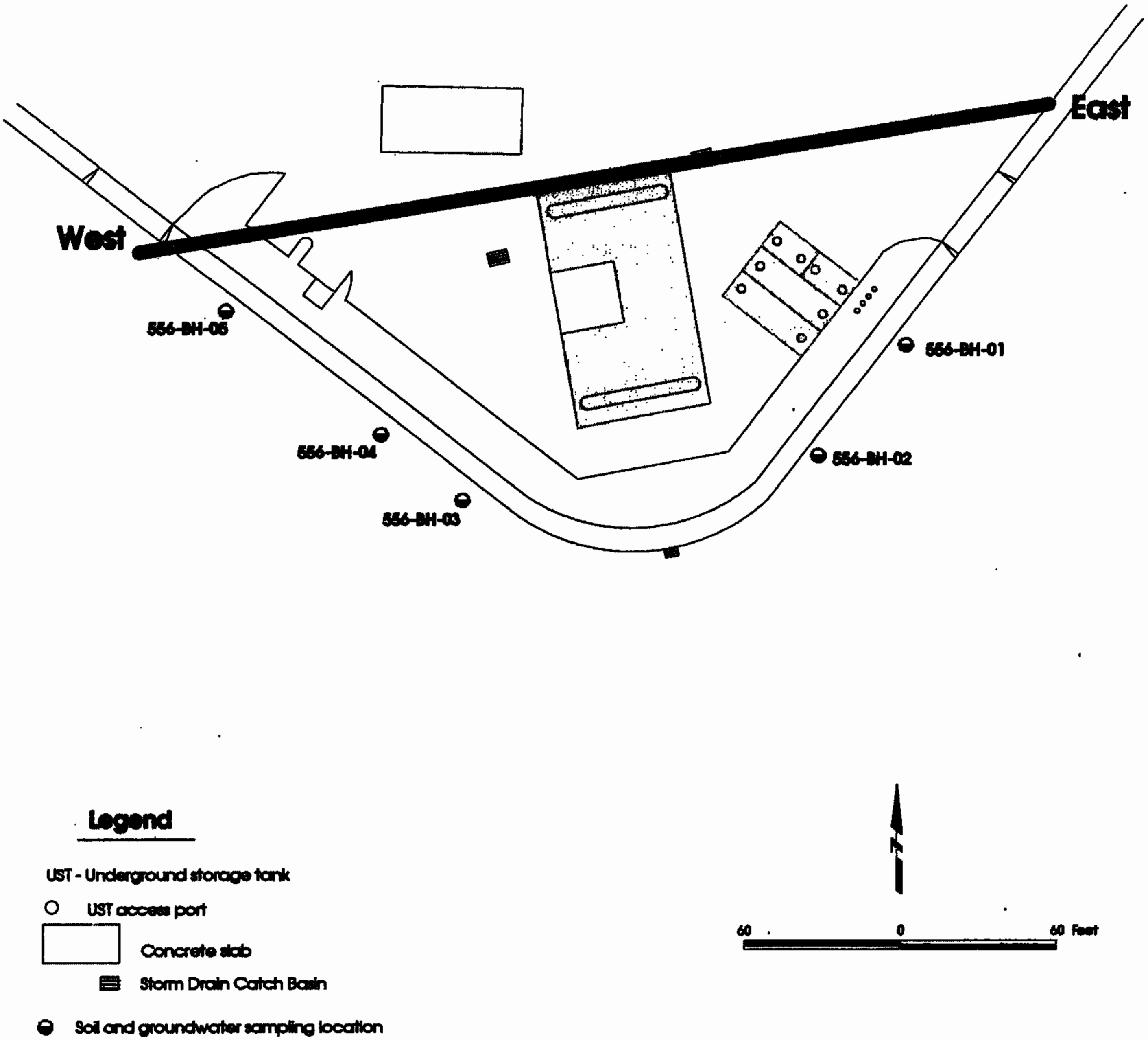
Site #556

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 4



See Figure 2 for description of site features and origin of base map.

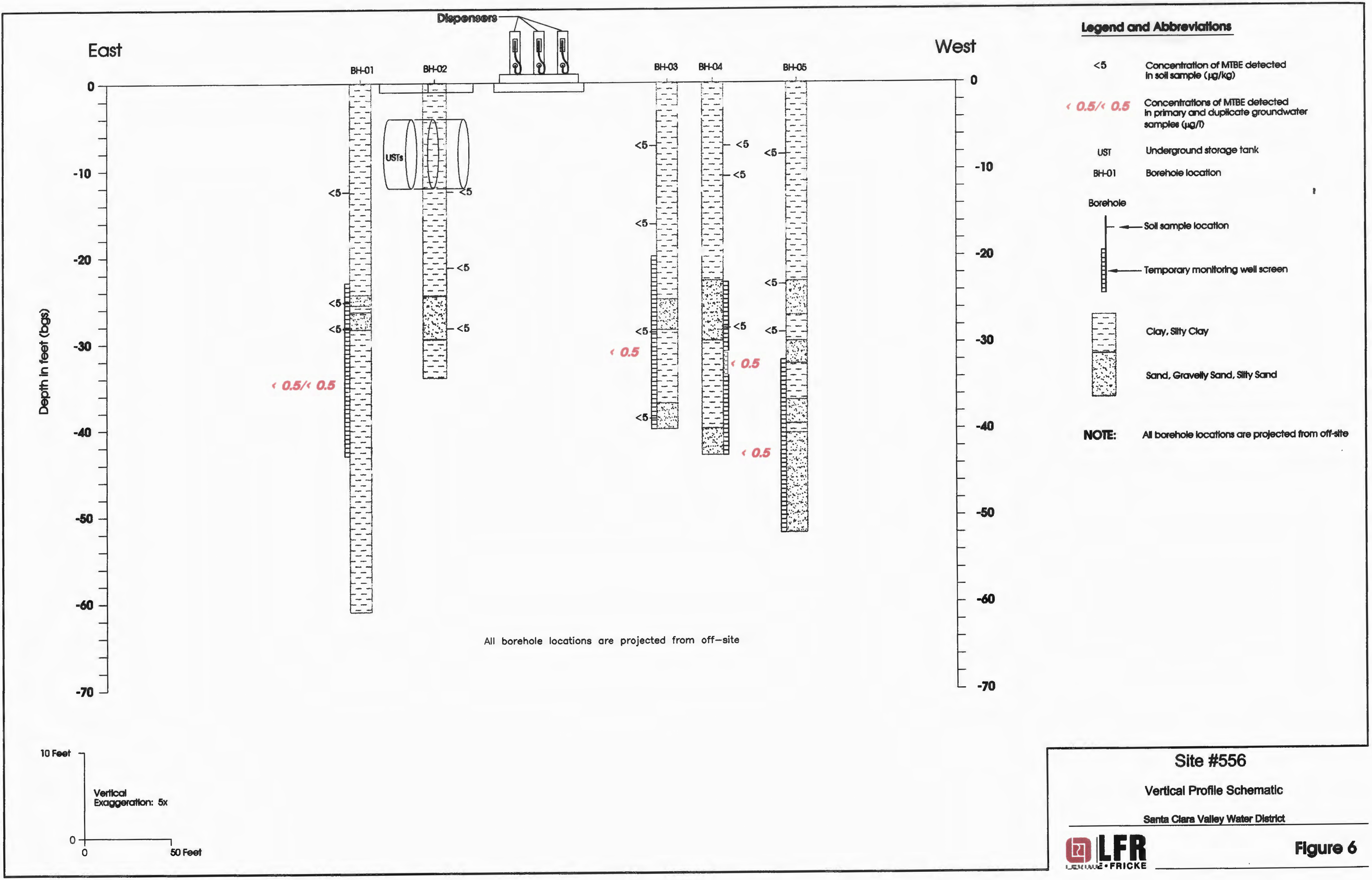
Site #556

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5


Dispensers
East
West
BH-01
BH-02
BH-03
BH-04
BH-05
USTs
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
<5
‹ 0.5/‹ 0.5
‹ 0.5
All borehole locations are projected from off–site
10 Feet
0
0
50 Feet
Vertical Exaggeration: 5x
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST Underground storage tank
BH-01 Borehole location
Borehole
Soil sample location
Temporary monitoring well screen
Clay, Silty Clay
Sand, Gravelly Sand, Silty Sand
NOTE: All borehole locations are projected from off-site

Site #556

Vertical Profile Schematic

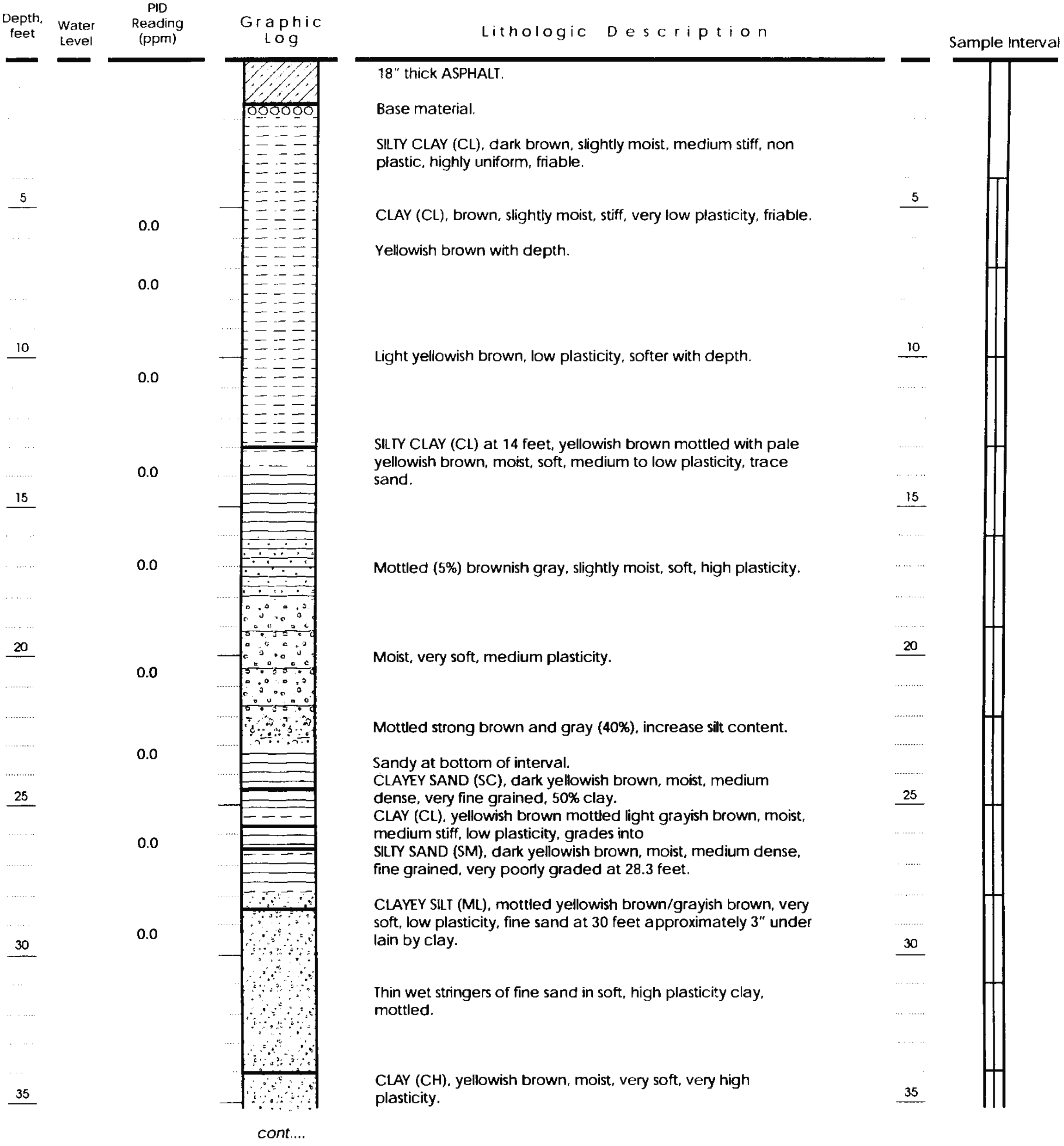
Santa Clara Valley Water District

LFR LEVINE·FRICKE

Figure 6

J:\ENGCAD\6730\CM#556.DWG 04/21/99 CM#556.PCP

SCVWD PILOT STUDY



Lithologic Description

18" thick ASPHALT.

Base material.

SILTY CLAY (CL), dark brown, slightly moist, medium stiff, non plastic, highly uniform, friable.

CLAY (CL), brown, slightly moist, stiff, very low plasticity, friable.

Yellowish brown with depth.

Light yellowish brown, low plasticity, softer with depth.

SILTY CLAY (CL) at 14 feet, yellowish brown mottled with pale yellowish brown, moist, soft, medium to low plasticity, trace sand.

Mottled (5%) brownish gray, slightly moist, soft, high plasticity.

Moist, very soft, medium plasticity.

Mottled strong brown and gray (40%), increase silt content.

Sandy at bottom of interval.
CLAYEY SAND (SC), dark yellowish brown, moist, medium dense, very fine grained, 50% clay.
CLAY (CL), yellowish brown mottled light grayish brown, moist, medium stiff, low plasticity, grades into
SILTY SAND (SM), dark yellowish brown, moist, medium dense, fine grained, very poorly graded at 28.3 feet.

CLAYEY SILT (ML), mottled yellowish brown/grayish brown, very soft, low plasticity, fine sand at 30 feet approximately 3" under lain by clay.

Thin wet stringers of fine sand in soft, high plasticity clay, mottled.

CLAY (CH), yellowish brown, moist, very soft, very high plasticity.

cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 2, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

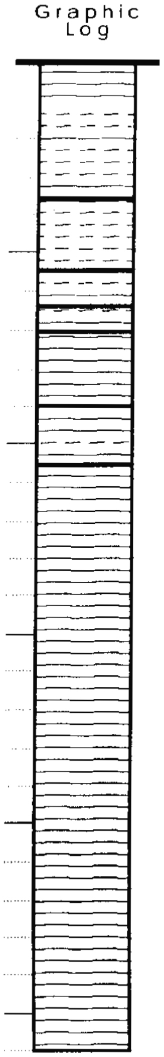
LFR
LEVINE•FRICKE

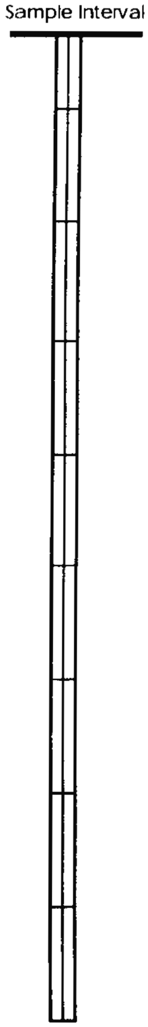
LITHOLOGY FOR 556-BH-01 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			CLAY (CH), as above, grades into
			CLAYEY SILT (MH), yellowish brown mottled 15% light gray, very moist, soft, high plasticity, grades into
		0.0	SANDY SILT (ML), yellowish brown mottled 30% gray, moist, medium stiff, very fine-grained sand, 40%, grades into
40			
		0.0	CLAYEY SILT (ML), mottled yellowish brown/brown-gray, moist. SILTY CLAY (CL), trace coarse sand at 42 feet, grades to CLAY (CH), grayish brown, very moist, very soft, very high plasticity, grades to
45		0.0	SILTY CLAY (CL), mottled gray/yellowish brown, moist, medium stiff, medium plasticity, drier than above.
			CLAY (CL), grayish brown, slightly moist, medium stiff, medium plasticity, highly uniform, no silty or wet zones.
		0.0	
50			Medium to high plasticity, slightly fatty, mottled 10% brownish gray.
		0.0	
		0.0	Stiff, medium plasticity, uniform, 10% gray mottling.
55			
		0.0	Very soft, high plasticity.
			Silty with depth, less plastic.
		0.0	Very stiff, siltier, trace sand, flecks of black, oxidized materials heavy, distinct mottling.
60			BOTTOM OF BORING AT 61 FEET.
65			
70			





Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 22, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
⚋	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

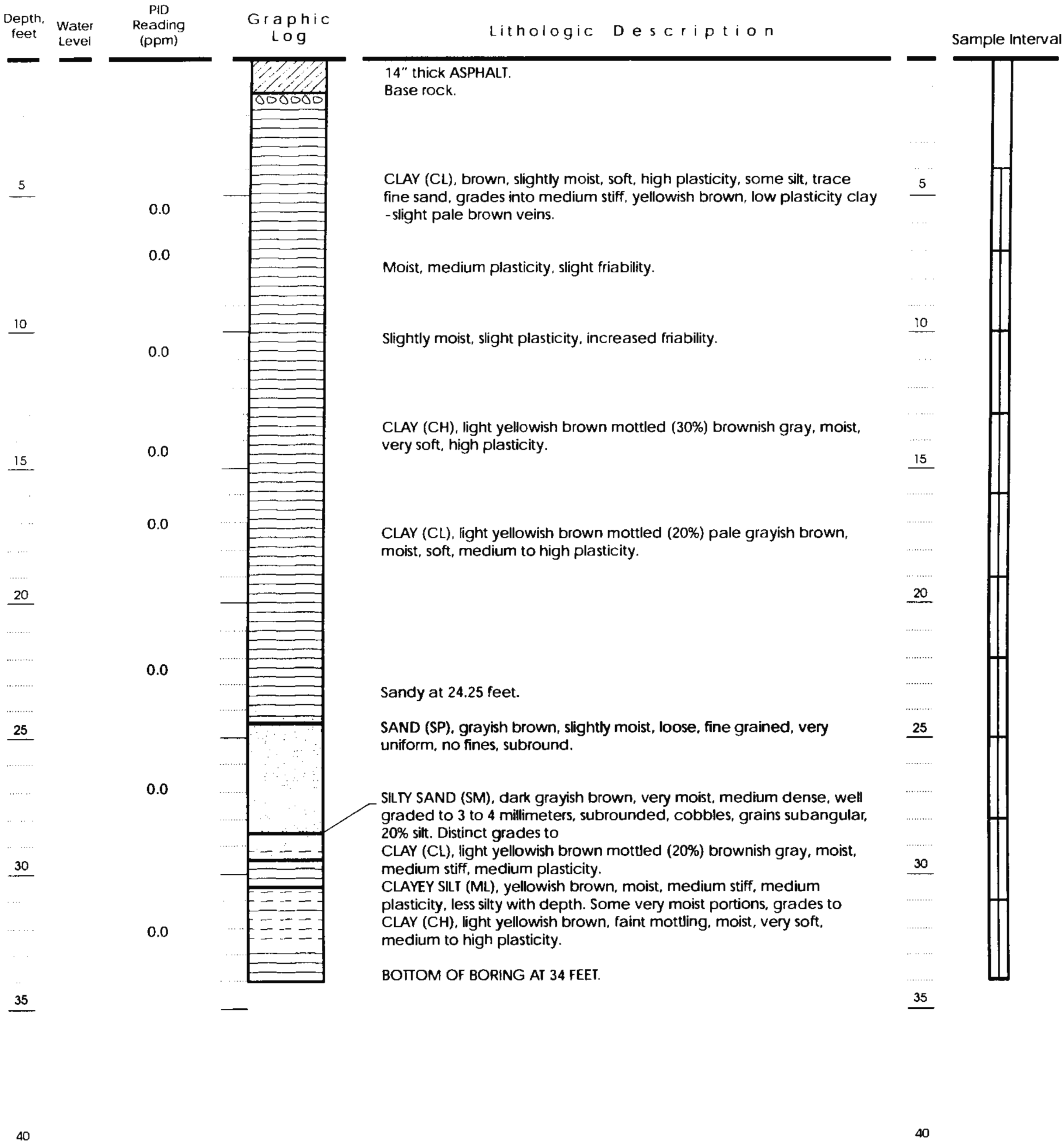
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-01 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



14" thick ASPHALT.
Base rock.

CLAY (CL), brown, slightly moist, soft, high plasticity, some silt, trace fine sand, grades into medium stiff, yellowish brown, low plasticity clay -slight pale brown veins.

Moist, medium plasticity, slight friability.

Slightly moist, slight plasticity, increased friability.

CLAY (CH), light yellowish brown mottled (30%) brownish gray, moist, very soft, high plasticity.

CLAY (CL), light yellowish brown mottled (20%) pale grayish brown, moist, soft, medium to high plasticity.

Sandy at 24.25 feet.

SAND (SP), grayish brown, slightly moist, loose, fine grained, very uniform, no fines, subround.

SILTY SAND (SM), dark grayish brown, very moist, medium dense, well graded to 3 to 4 millimeters, subrounded, cobbles, grains subangular, 20% silt. Distinct grades to
CLAY (CL), light yellowish brown mottled (20%) brownish gray, moist, medium stiff, medium plasticity.
CLAYEY SILT (ML), yellowish brown, moist, medium stiff, medium plasticity, less silty with depth. Some very moist portions, grades to CLAY (CH), light yellowish brown, faint mottling, moist, very soft, medium to high plasticity.

BOTTOM OF BORING AT 34 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 23, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ░ Sand
- ▒ Gravel

PID -Photoionization Detector

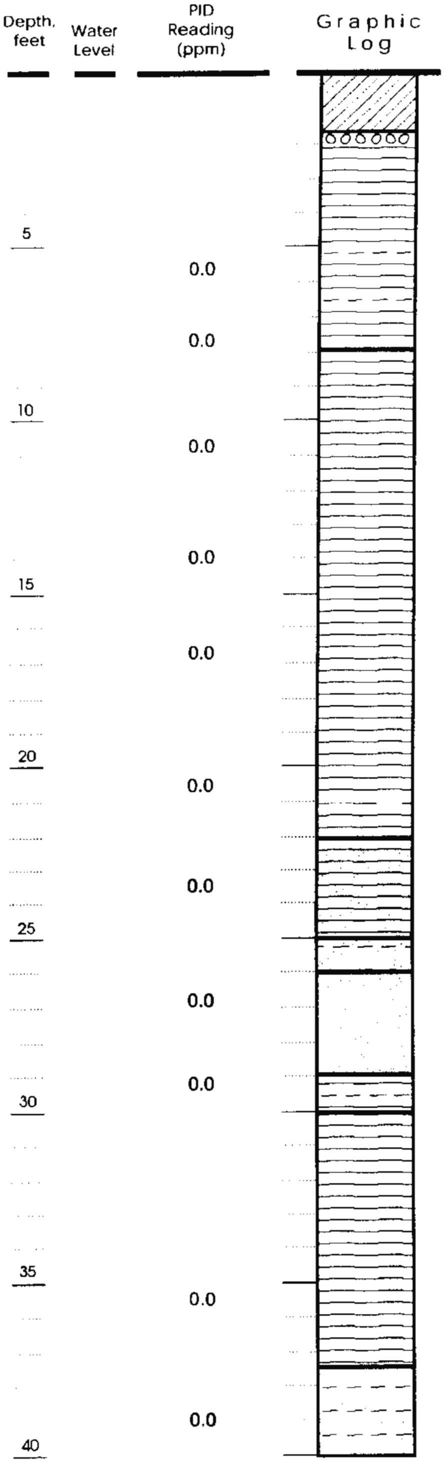
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-02 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



Lithologic Description

18" thick ASPHALT.

Base rock material.

CLAY (CL).

SILTY CLAY (CL), brown, slightly moist, medium stiff, low plasticity, slight friability with blocky cleavage. Grades into

Yellowish brown with dark brown inclusions, soft, medium plasticity, grades to

CLAY (CL), light yellowish brown mottled (15%) pale brown veins, slightly moist, medium stiff, low plasticity, friable, some silt.

Faint mottling, medium plasticity.

Softer, medium to high plasticity, less friable.

Mottled (20%) light brownish gray.

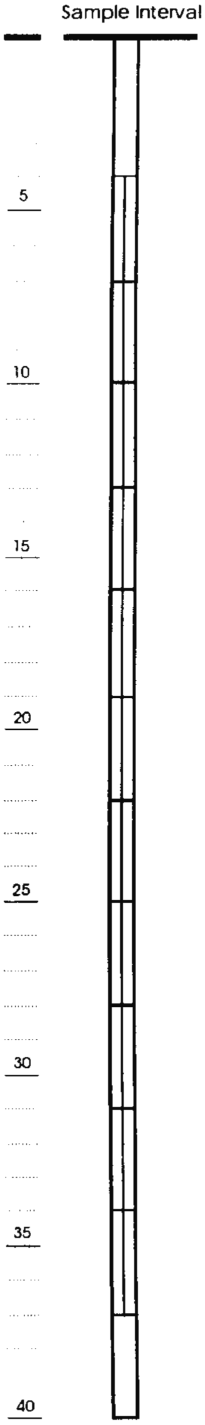
Moist, very soft, high plasticity.

SILTY CLAY (CL), similar as above, trace fine sand.
Slightly friable, slightly moist, soft, medium plasticity.
Very thin fine sand layer at 22 feet, moist, less than 1 centimeter.
SANDY CLAY (CL), yellowish brown with distinct mottling and flecks of dark brownish gray and pale brown, soft, medium to high plasticity. Less sand at 22.5 feet, grades into
SILTY SAND (SM) at 25 feet, moist, loose, fine grained, very poorly graded.
SAND (SP) at 26 feet, dark yellowish brown, moist, very fine grained, loose, trace silt, very moist at 28.5 feet, grades into sandy clay then

SILTY CLAY (CL) at 29 feet, yellowish brown, heavily mottled strong brown, pale gray, dark grayish brown, moist, very soft, medium plasticity, grades to
CLAY (CH), mottled yellowish brown as above, moist, very soft, medium to high plasticity

SILTY SAND (SM), dark grayish brown, very moist, very poorly graded, fine grained, subrounded.
Trace silt with depth.

BOTTOM OF BORING AT 40 FEET.



EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

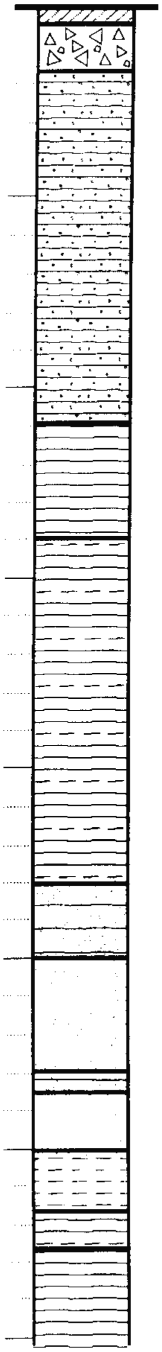
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 24, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

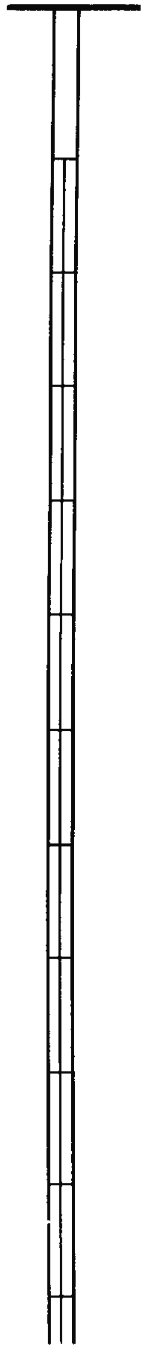
LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-03 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			3" thick ASPHALT. 18" thick CONCRETE.
5		0.0	GRAVELLY CLAY (CL), dark grayish brown, slightly moist, medium stiff, medium to low plasticity, fill material, 15% fine gravel, rounded 0.5 centimeter, trace coarse gravel and fine brownish yellow sand.
		0.0	
			Stiff, trace angular coarse gravel (sandstone).
			Decreased gravel, some coarse sand.
10			Mottled dark grayish brown and brown, very soft, high plasticity.
		0.0	Native soil at 11 feet.
			CLAY (CL), yellowish brown, faint mottling (20%) brownish gray, moist, soft, low plasticity, friable, rare rootlets, vertical.
		0.0	
15			SILTY CLAY (CL), yellowish brown, moist, very soft, slight plasticity.
		0.0	
			Mottled (40%) pale gray and brown, soft, low plasticity.
			Faint mottling with depth, less silt.
20			Very soft, medium to high plasticity, uniform, friable.
		0.0	
			Siltier with depth, grading into fine sand.
		0.0	CLAYEY SAND (SC), dark yellowish brown to grayish brown, moist, 15% clay.
25			SAND (SP), dark yellowish brown, moist, medium dense to loose, less than 10% silt, very poorly graded, very fine grained.
		0.0	
			Clayey sand.
		0.0	SAND (SP) at 28.5 feet, dark yellowish brown, moist, fine grained, no fines, clean, uniform, grades into
30			SANDY SILT (ML), yellowish brown mottled gray, moist, medium stiff, non plasticity, very fine sand, grades into
			SILTY CLAY (CL), moist, very soft, medium plasticity, grades into
		0.0	CLAY (CL), moist, very soft, low plasticity.
35			

cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 24, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID -Photoionization Detector

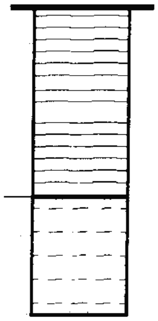
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-04 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
				CLAY (CL), yellowish brown, strongly mottled gray and strong brown, moist, very soft, medium to low plasticity.		
		0.0		Sandy at 37 feet, grades to clay, very moist.		
		0.0				
40					40	
		0.0		SILTY SAND (SM), dark grayish brown, wet to saturated, medium dense, fine grained, 15% silt.		
				BOTTOM OF BORING AT 43 FEET.		
45					45	
50					50	
55					55	
60					60	
65					65	
70					70	

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 24, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

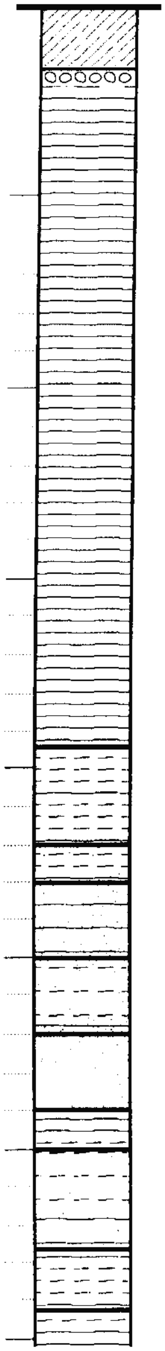
LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

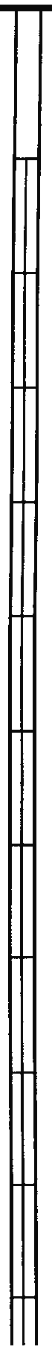
SCVWD PILOT STUDY

Graphic Log



cont....

Sample Interval



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			18" thick ASPHALT.
5			CLAY (CL), brown, slightly moist, stiff, non plastic, friable, blocky structure, common minute root channels and pores, some silt. Grades to
		0.0	
			Yellowish brown, non blocky, grades to
		0.0	
			Medium stiff, pores absent.
10			
		0.0	Medium stiff to soft, slight plasticity.
		0.0	Very soft, low plasticity.
15			Silty with depth, mottled (10%) brownish gray, moist, soft, medium plasticity.
		0.0	30% silt, high plasticity.
20			CLAYEY SILT (ML), yellowish brown mottled (25%) pale brown to gray, moist, soft, medium plasticity, grades into
		0.0	
			SANDY CLAYEY SILT (ML), yellowish brown mottled (40%) strong brown, olive-gray, dark gray, moist, soft, slight plasticity, 15% very fine sand.
		0.0	CLAYEY SAND (SC), yellowish brown, slightly moist, very fine, poorly graded, grades into
25			SILTY SAND (SM), dark yellowish brown, slightly moist, medium dense, very poorly graded, fine sand, 35% silt.
		0.0	SILTY CLAY (CL) interbed at 26.5 feet, 2 inches, mottled.
			SAND (SP), dark yellowish brown, moist, loose, very fine grained, less than 10% silt.
			SILTY CLAY (CL), yellowish brown heavy mottling, soft, medium to high plasticity.
30		0.0	SILTY SAND (SM) as at 25 feet.
			CLAYEY SAND (SC), moist, grades to
		0.0	CLAYEY SILT (ML), grades to
35			SILTY CLAY (CH), very moist, very soft, high plasticity.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 25, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
┅ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

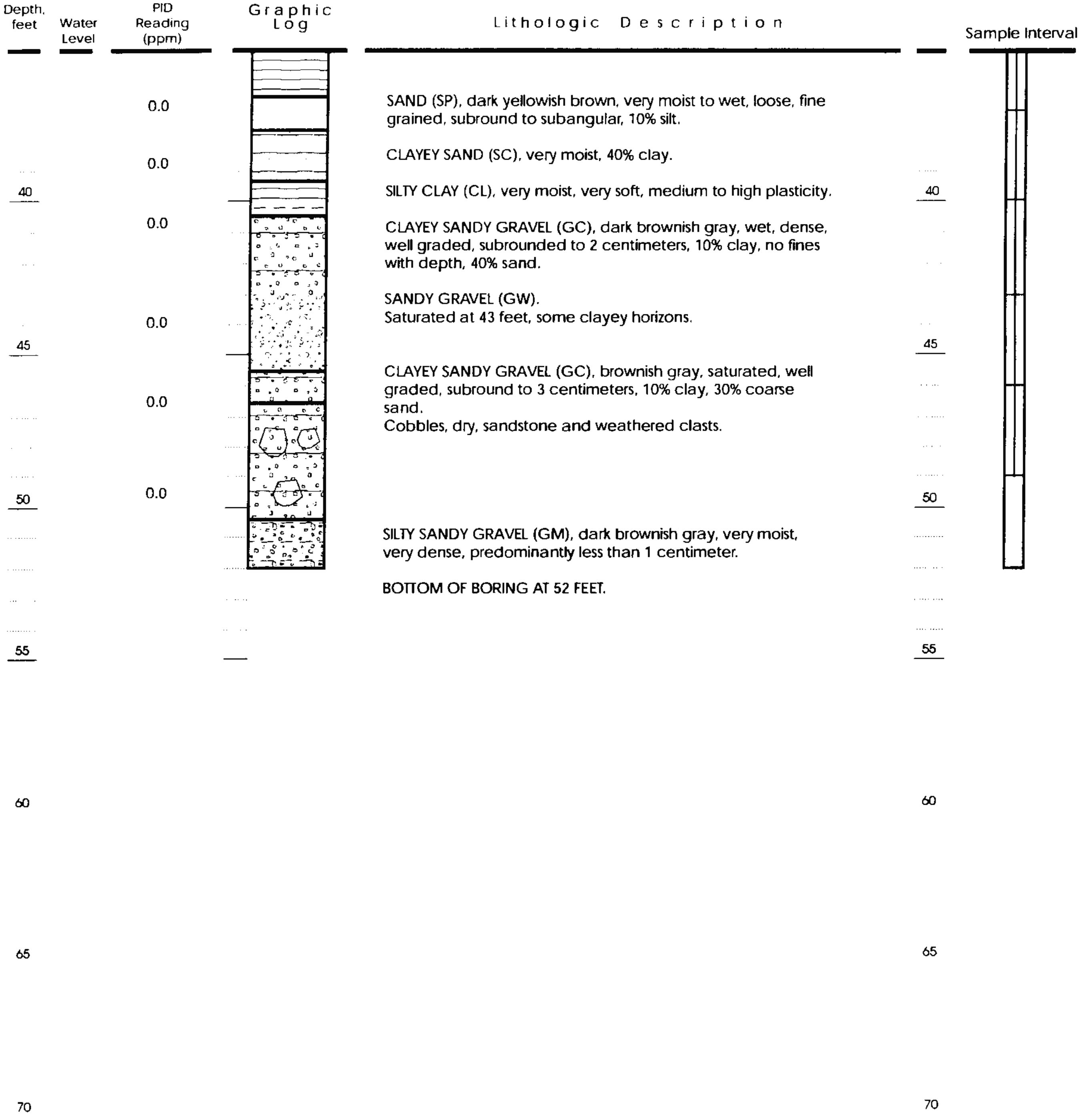
▼ Water level at time of drilling

LFR
LEVINE·FRICKE

LITHOLOGY FOR 556-BH-05 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



SAND (SP), dark yellowish brown, very moist to wet, loose, fine grained, subround to subangular, 10% silt.

CLAYEY SAND (SC), very moist, 40% clay.

SILTY CLAY (CL), very moist, very soft, medium to high plasticity.

CLAYEY SANDY GRAVEL (GC), dark brownish gray, wet, dense, well graded, subrounded to 2 centimeters, 10% clay, no fines with depth, 40% sand.

SANDY GRAVEL (GW).
Saturated at 43 feet, some clayey horizons.

CLAYEY SANDY GRAVEL (GC), brownish gray, saturated, well graded, subround to 3 centimeters, 10% clay, 30% coarse sand.
Cobbles, dry, sandstone and weathered clasts.

SILTY SANDY GRAVEL (GM), dark brownish gray, very moist, very dense, predominantly less than 1 centimeter.

BOTTOM OF BORING AT 52 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	February 25, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 556-BH-05 *(page 2 of 2)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 571

SCVWD Almaden Fueling Facility
5750 Almaden Expressway
San Jose, California 95118

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of sands and gravelly sands, with minor silt intervals to depths of approximately 30 feet below the ground surface (bgs), the total depth sampled. Groundwater was encountered at approximately 15 feet bgs.

SYSTEM DESCRIPTION

The UST system at the site consists of three 12,000-gallon double-walled USTs (two diesel and one gasoline) constructed of steel clad with fiberglass reinforced plastic and fiberglass reinforced plastic secondary containment, and double-walled fiberglass piping. The UST system includes continuous interstitial leak detection for the UST and automatic line leak detection for the piping.

RESULTS

MtBE was not detected in any of the 18 soil gas or 9 groundwater samples collected at the site and was detected in one of 20 soil samples at a concentration of 7.5 μg/kg. Petroleum hydrocarbons (benzene, toluene, ethylbenzene, xylenes and gasoline range total petroleum hydrocarbons) were detected in 2 of the 18 soil gas samples, but were not detected in any of the soil or groundwater samples collected from this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Case closed; see comments below
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Not from current UST system; former system release described below
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

In 1992, a 10,000-gallon gasoline tank, a 3,000-gallon diesel tank, and a 550-gallon waste oil tank were removed from an area approximately 250 west of the current tank location. TPH-D was found in one sample at a concentration of 78 ppm, TPH-G was found in one sample at a concentration of 2.8 ppm, and xylene was found in one sample at a concentration of 0.11 ppm. A total of 585 cubic feet of impacted soils were excavated. Post-excavation sampling indicated the affected soils had been removed.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes, from monitoring system print out.
Date of last test:	Within 6 months of the inspection
Method of tank testing:	Automatic tank gauging
Tank leak rate (gallons/hour):	<0.2
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Float
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Autostick 950
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Fair
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 8 years
Years of operation as fueling facility:	Greater than 30 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	
Systems operations, comment:	Liquid probe in turbine sumps functionally tested during inspection - last calibrated 4 months previously.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Not available
Spill log reviewed?	Yes
Spill log comments:	No spills logged
Personnel training:	Good - manager knowledgable of system.

Comments:

System programed for monthly in-tank test @ 0.2 gph.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To east
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Collection grate at northest end of dispenser island: closed system leading to car wash sump (~70' southwest of dispenser island), but not operational. During ponding, surface water is collected manually and hand delivered to the sump.
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	Yes
Name of surface water:	Almaden Lake (>500' from site)
Type of surface water:	Lake

Comments:

Pavement around pads in poor shape. Former tank removed from area >250' west of current tank location. Observed 3-4 monitoring wells in former tank vicinity, but potentially more.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3

Date installed:	New
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Automatic line leak detector
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #571
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
571-SG-01	11/18/98	5	<5	<100	<1	<1	<1	4.1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		18	<5	<100	<1	<1	<1	<1	<1	
571-SG-02	11/18/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		16.5	<5	<100	<1	<1	<1	<1	<1	
571-SG-03	11/18/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
571-SG-04	11/18/98	5	<5	<100	<1	<1	<1	<1	<1	
571-SG-04-SPL		5	<0.010	NA	0.0042 J	0.010	<0.0029	0.010 J	0.0032 J	(a)
571-SG-04		12	<5	<100	<1	<1	<1	<1	<1	
571-SG-04-DUP		12	<5	<100	<1	<1	<1	<1	<1	
571-SG-05	11/18/98	5	<5	<100	<1	1.5	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
571-SG-06	11/19/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
571-SG-07	11/19/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.023 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #571
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
571-BH-01	11/30/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.0-17.5	8.1	<1	<5	7.5	<5	<5	<5	<20	<20	<20	<200
571-BH-02	12/01/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
571-BH-03	12/01/98	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
571-BH-04	11/30/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.5-18.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
571-BH-05	12/01/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
571-BH-06	12/01/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
571-BH-07	12/04/98	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 571
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
571-BH-01	11/30/98	22.5-24.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
		28.0-30.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-02	12/01/98	23.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-03	12/01/98	19.5-21.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-04	11/30/98	23.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-05	12/01/98	16.5-18.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-05-DUP		16.5-18.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-06	12/01/98	16.5-18.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
571-BH-07	12/04/98	17.0-19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:
All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

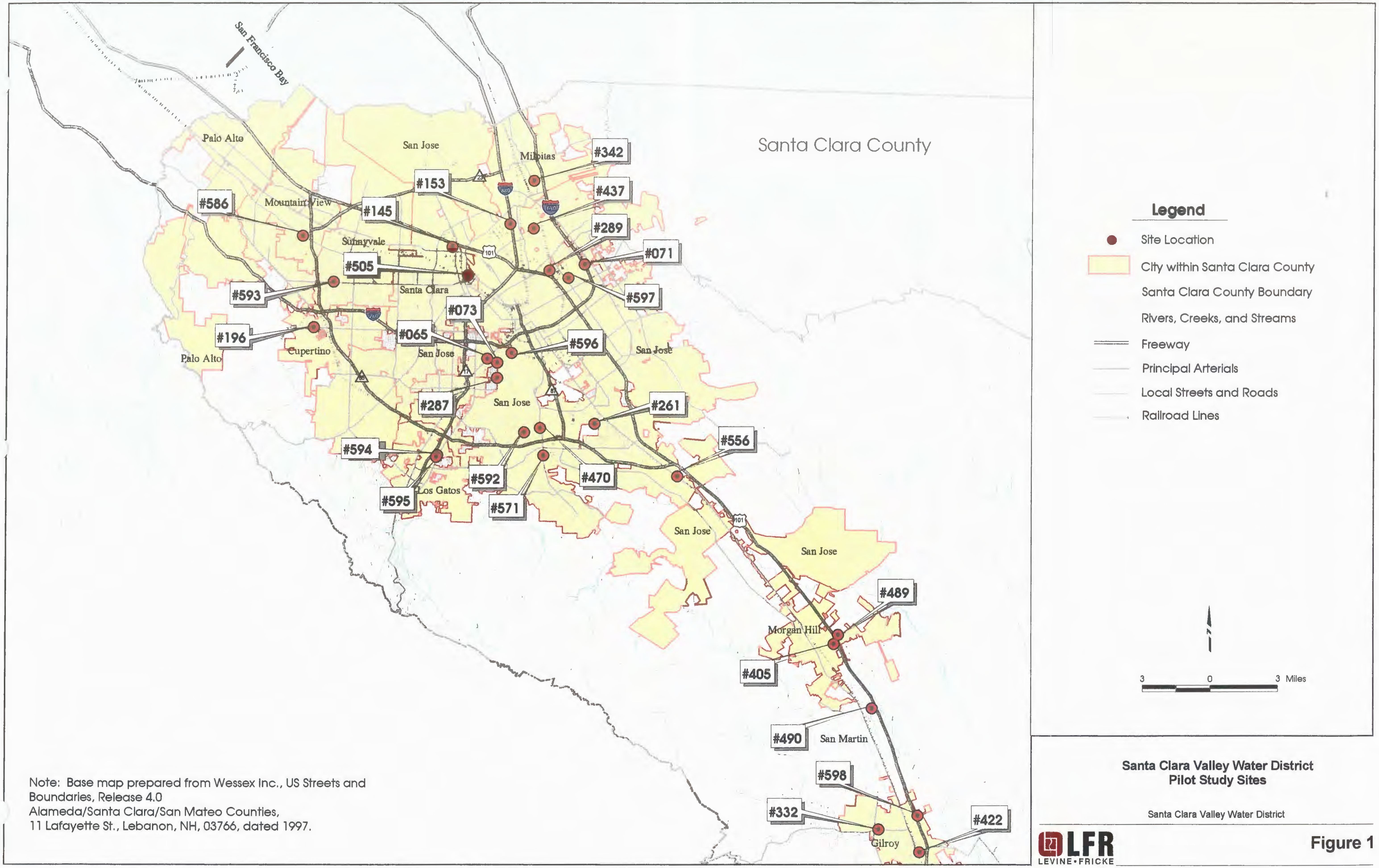
J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 4
Summary of Physical Parameters for Soil Samples - Site #571
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
571-BH-06	11.0 - 11.5	Gray brown gravelly sand	NA	6.03	154.8	146.0	13.32

Table proofed by CLC.

Notes:
Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



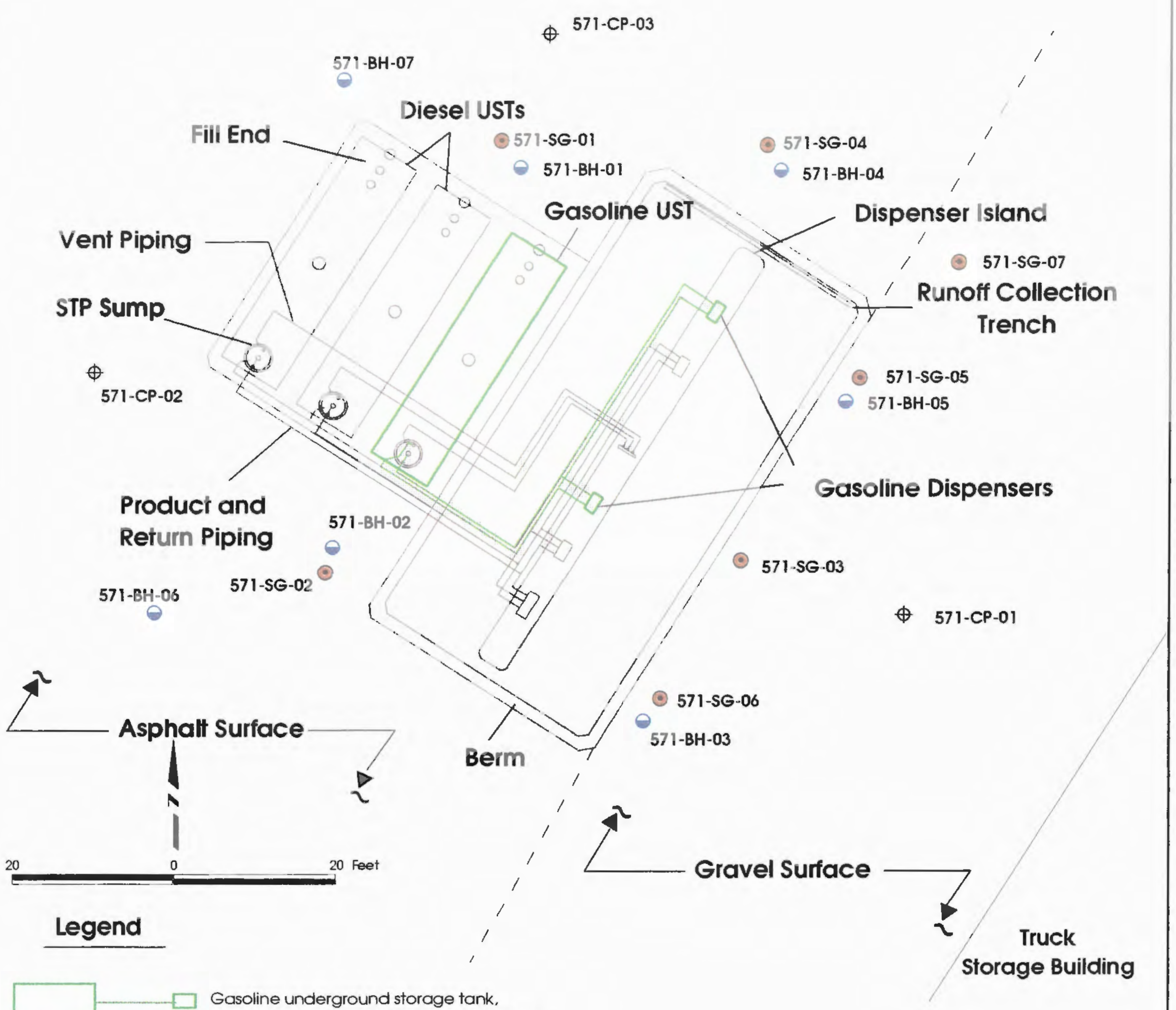
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Piping Plan & Installation Details, sheet M-1, Alameda Fueling Facility, San Jose, CA, by CEMEC Civil Engineering & Mechanical Engineering Company, Inc., of Santa Rosa, CA, dated 10/29/90

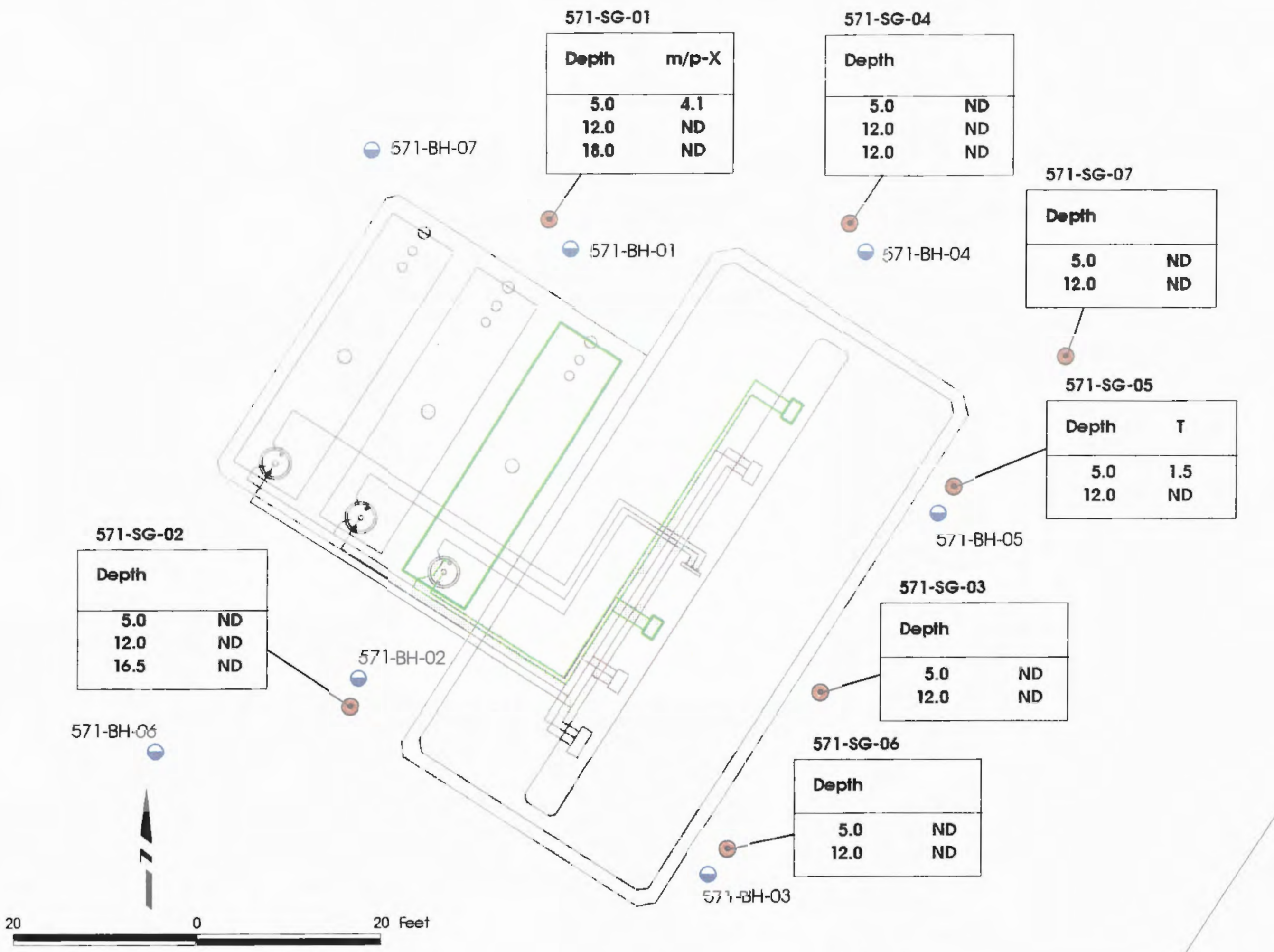
Site #571

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2

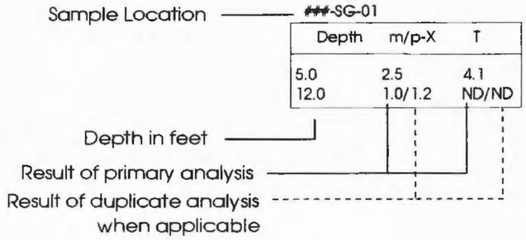


Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

⬚ Concrete slab

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed suing Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

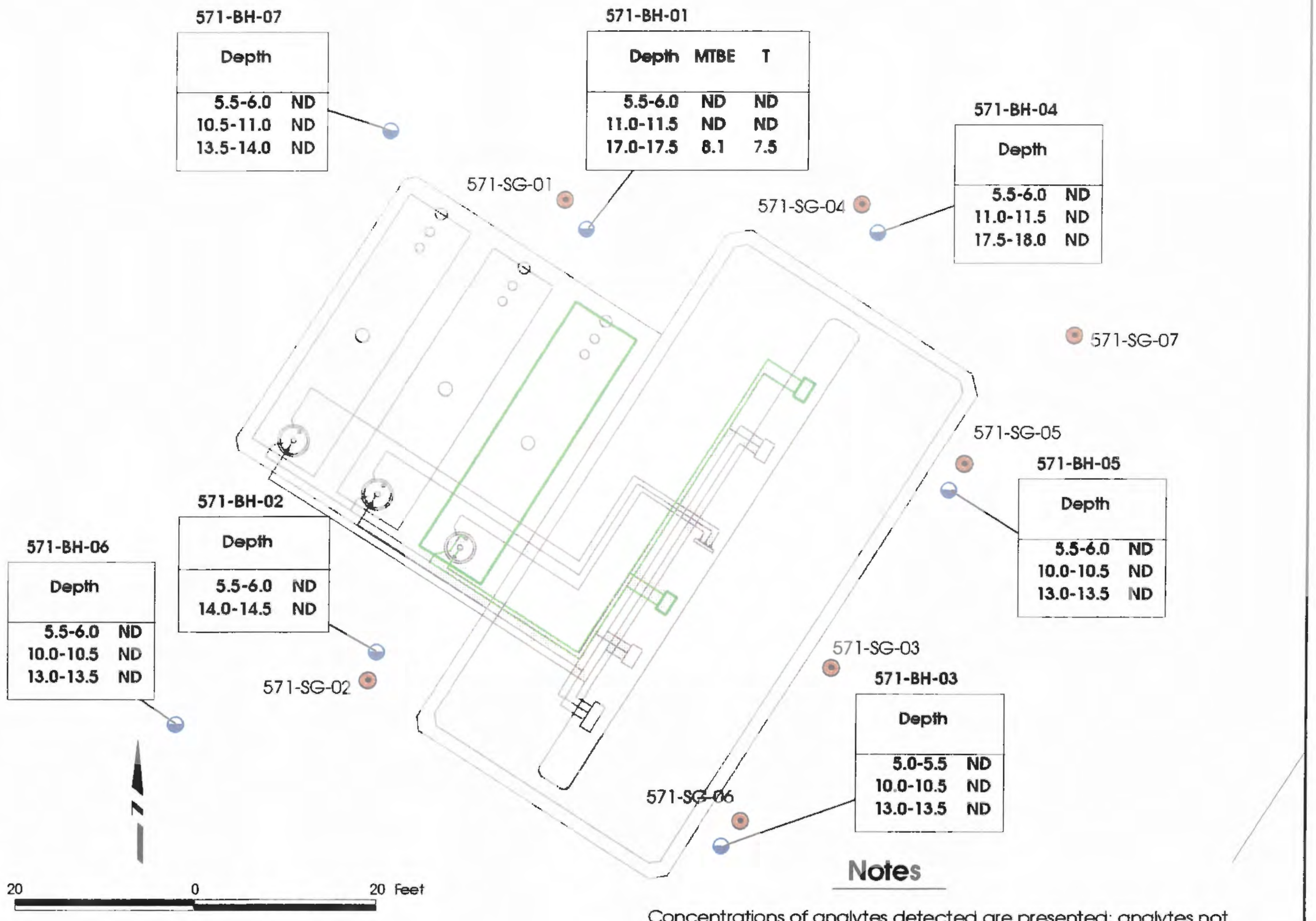
Site #571

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

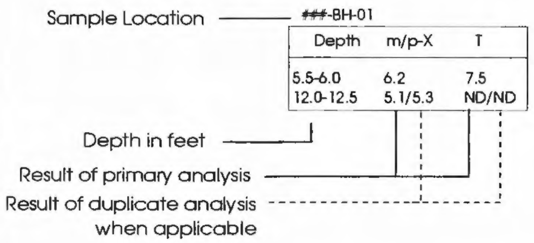
MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

See Figure 2 for description of site features and origin of base map.

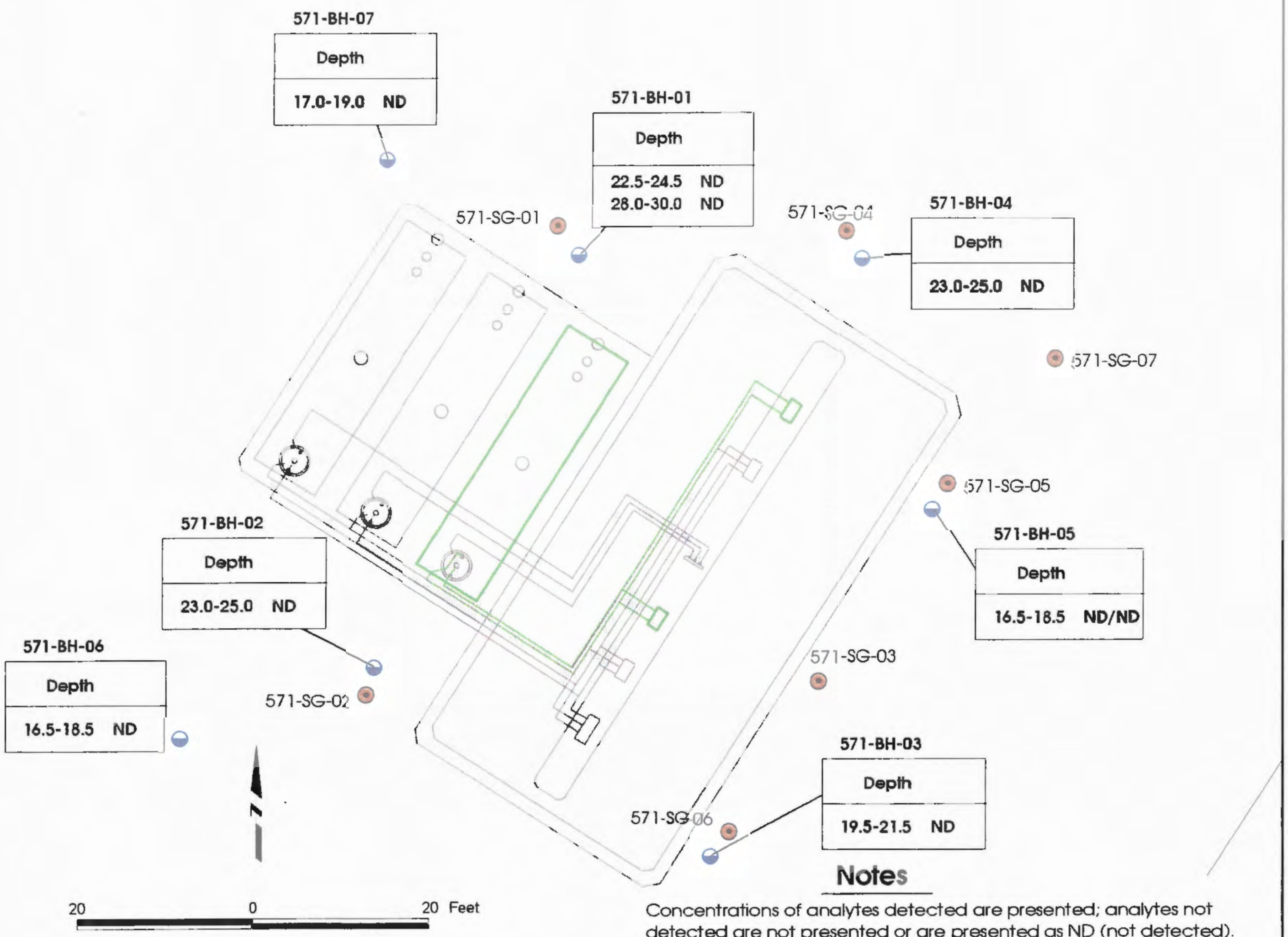
Site #571

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

◒ Soil and groundwater sampling location

◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0 12.0-12.5	6.2 5.1/5.3	7.5 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

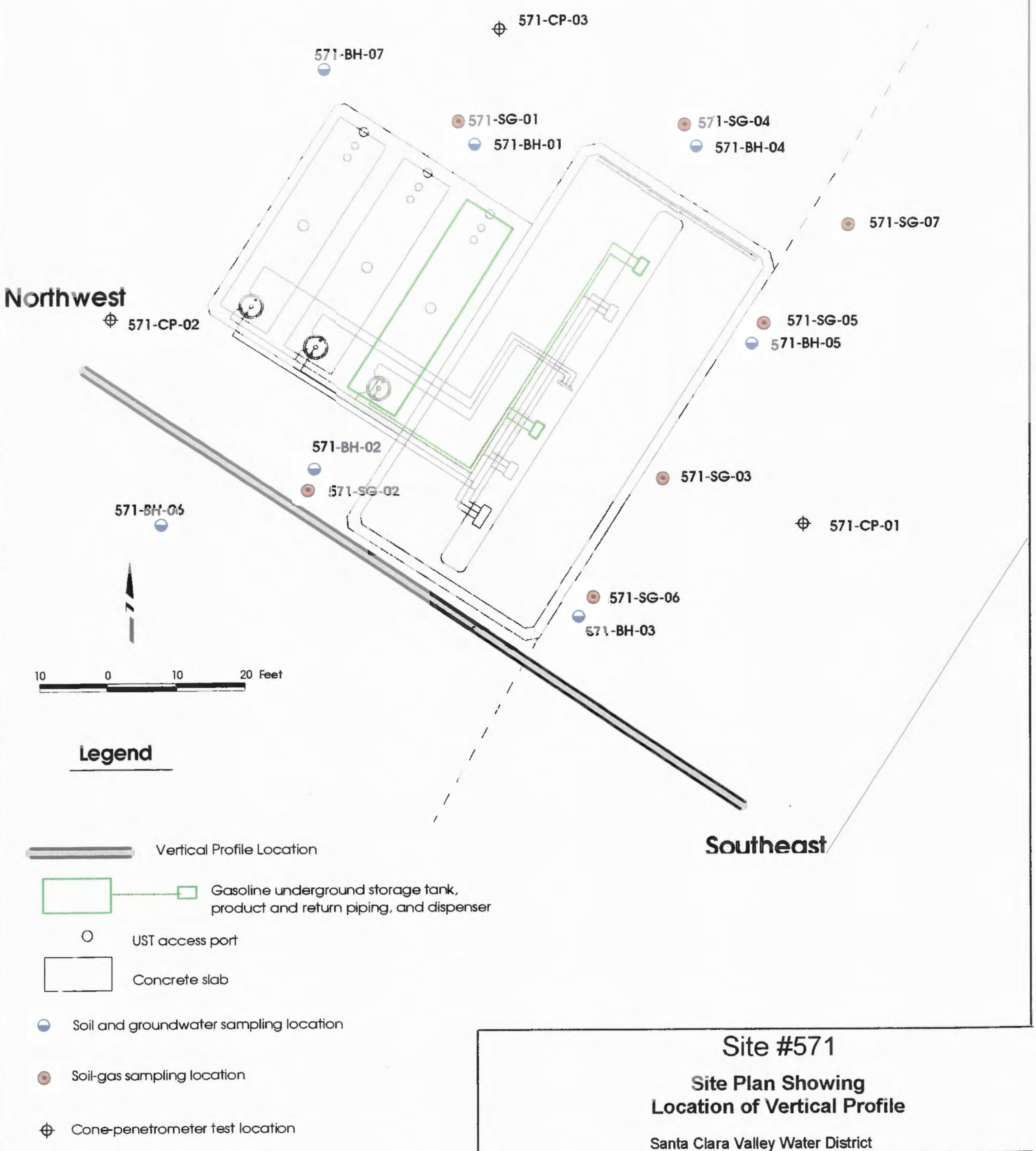
Site #571

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 5



See Figure 2 for description of site features and origin of base map.

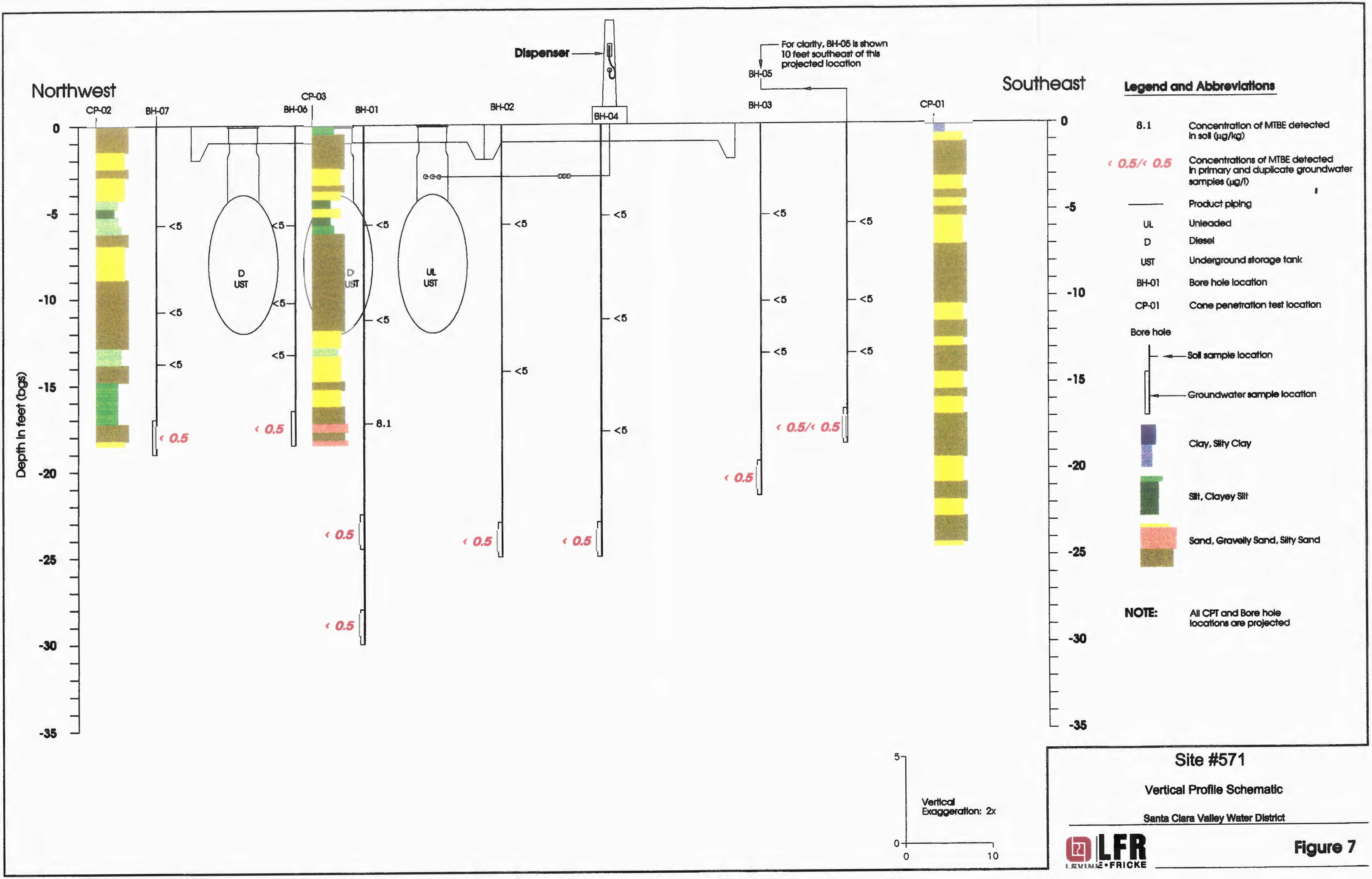
Site #571

Site Plan Showing Location of Vertical Profile

Santa Clara Valley Water District

LFR LEVINE • FRICKE

Figure 6


Northwest
Southeast
Dispenser
For clarity, BH-05 is shown 10 feet southeast of this projected location
BH-05
CP-02
BH-07
BH-06
CP-03
BH-01
BH-02
BH-04
BH-03
CP-01
Depth in feet (bgs)
0
-5
-10
-15
-20
-25
-30
-35
D UST
D UST
UL UST
<5
8.1
‹ 0.5
‹ 0.5/‹ 0.5
Legend and Abbreviations
8.1 Concentration of MTBE detected in soil (µg/kg)
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Product piping
UL Unleaded
D Diesel
UST Underground storage tank
BH-01 Bore hole location
CP-01 Cone penetration test location
Bore hole
Soil sample location
Groundwater sample location
Clay, Silty Clay
Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Bore hole locations are projected
5
0
0
10
Vertical Exaggeration: 2x

Site #571

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE·FRICKE

Figure 7

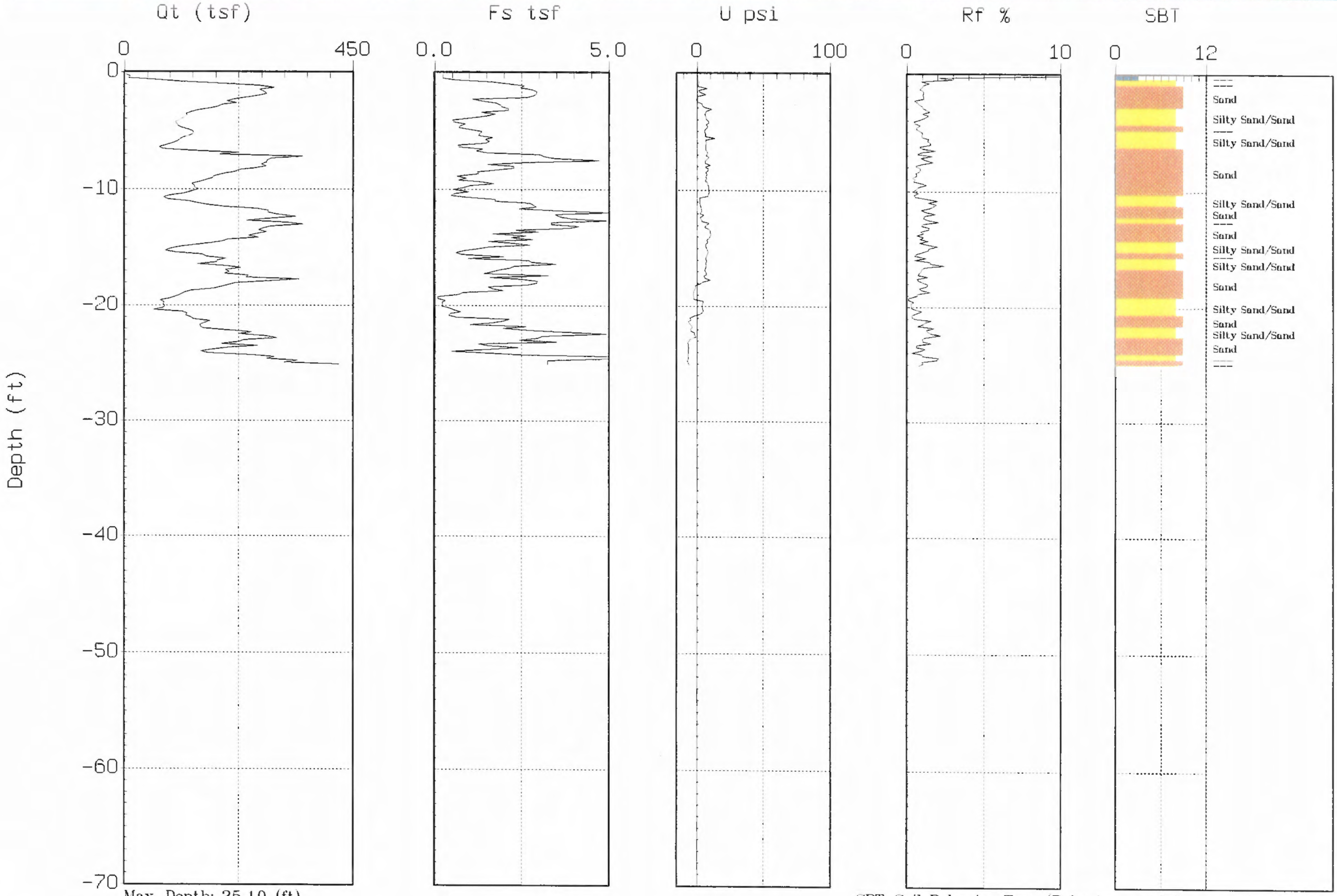
J:\ENGCAD\6730\CM#571.DWG 03/11/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: 571
Location : 571-CP-01

Geologist: Todd Miller
Date : 11:04:98 12:41



Max. Depth: 25.10 (ft)

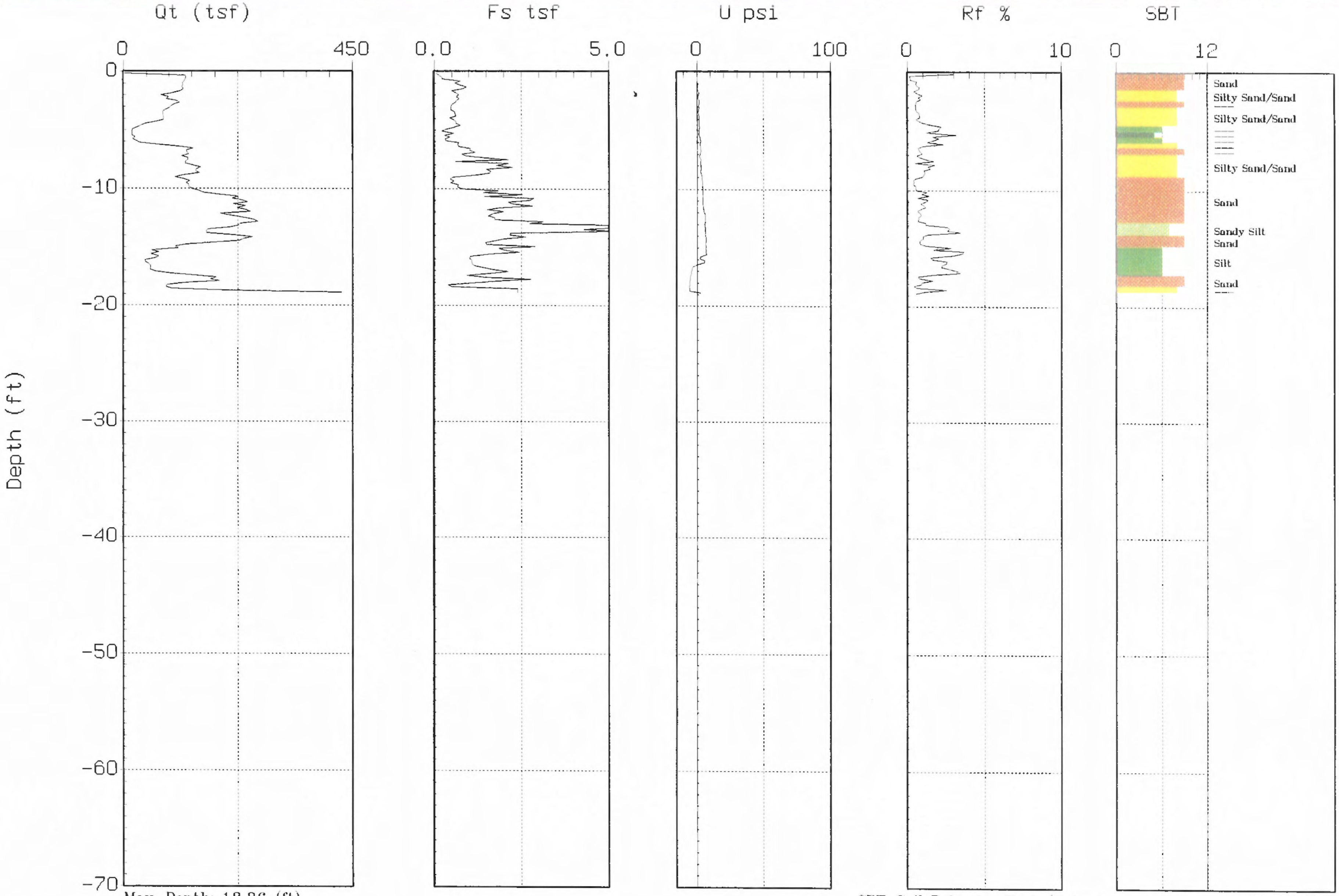
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 571
Location : 571-CP-02

Geologist: Todd Miller
Date : 11:04:98 15:08



Max. Depth: 18.86 (ft)

Depth Inc.: 0.164 (ft)

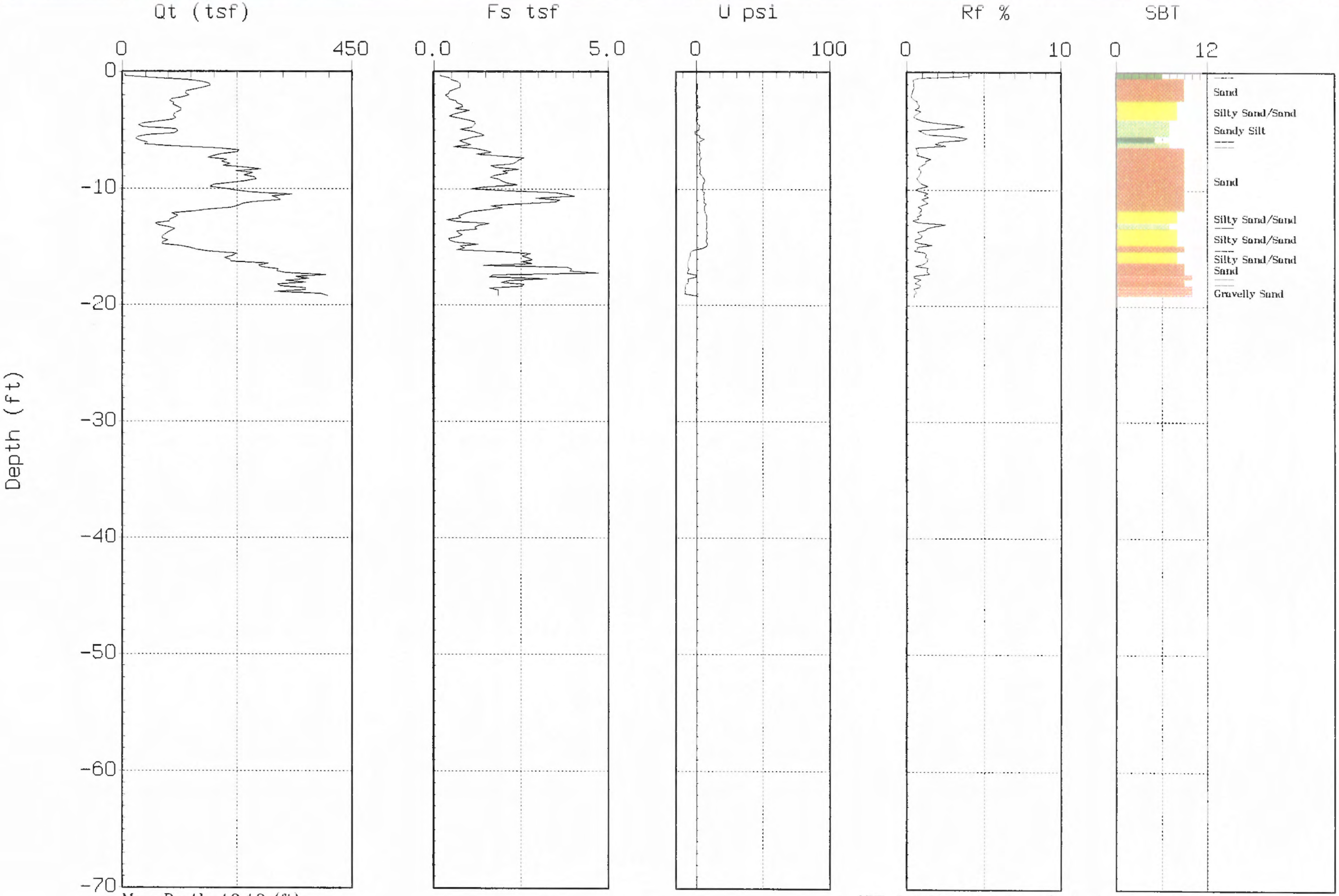
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 571
Location : 571-CP-03

Geologist: Todd Miller
Date : 11:04:98 14:14



Max. Depth: 19.19 (ft)

Depth Inc.: 0.164 (ft)

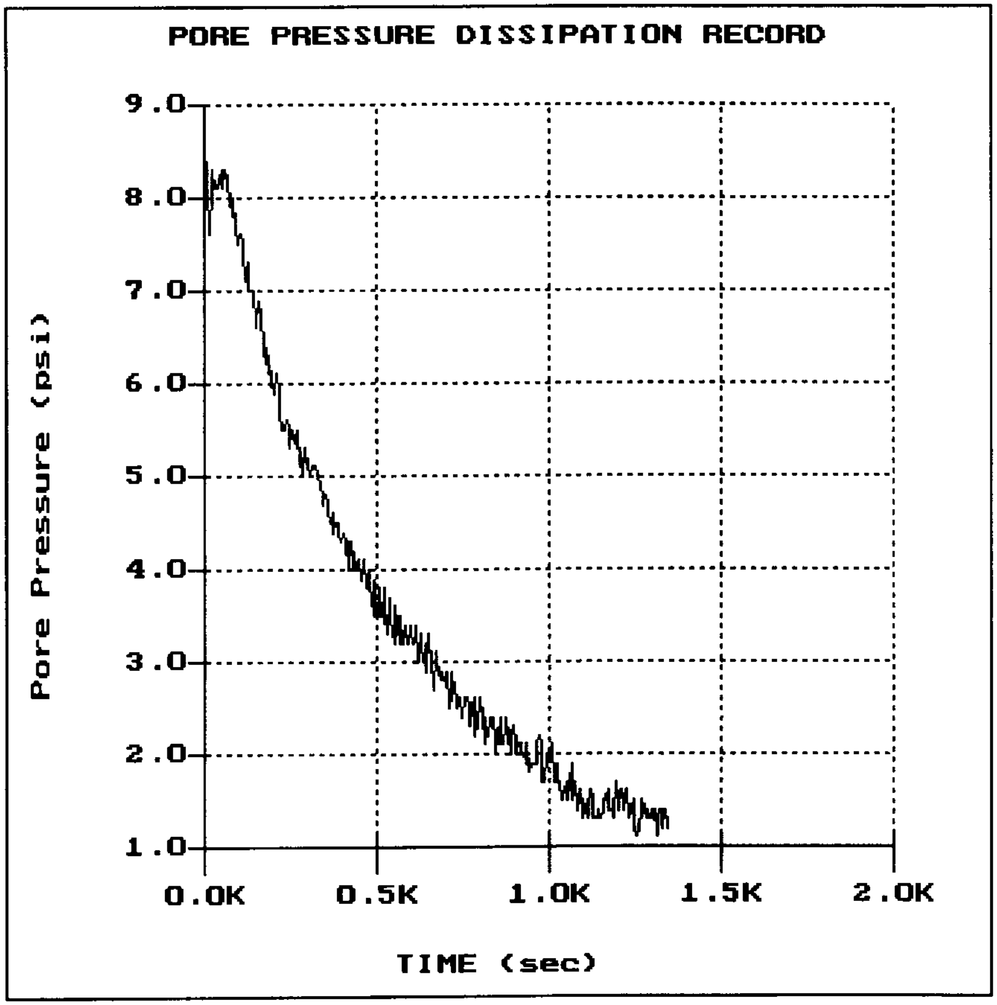
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:571-CP-01
Location:#571

Cone:20 TON AD071
Date:11:04:98 12:41

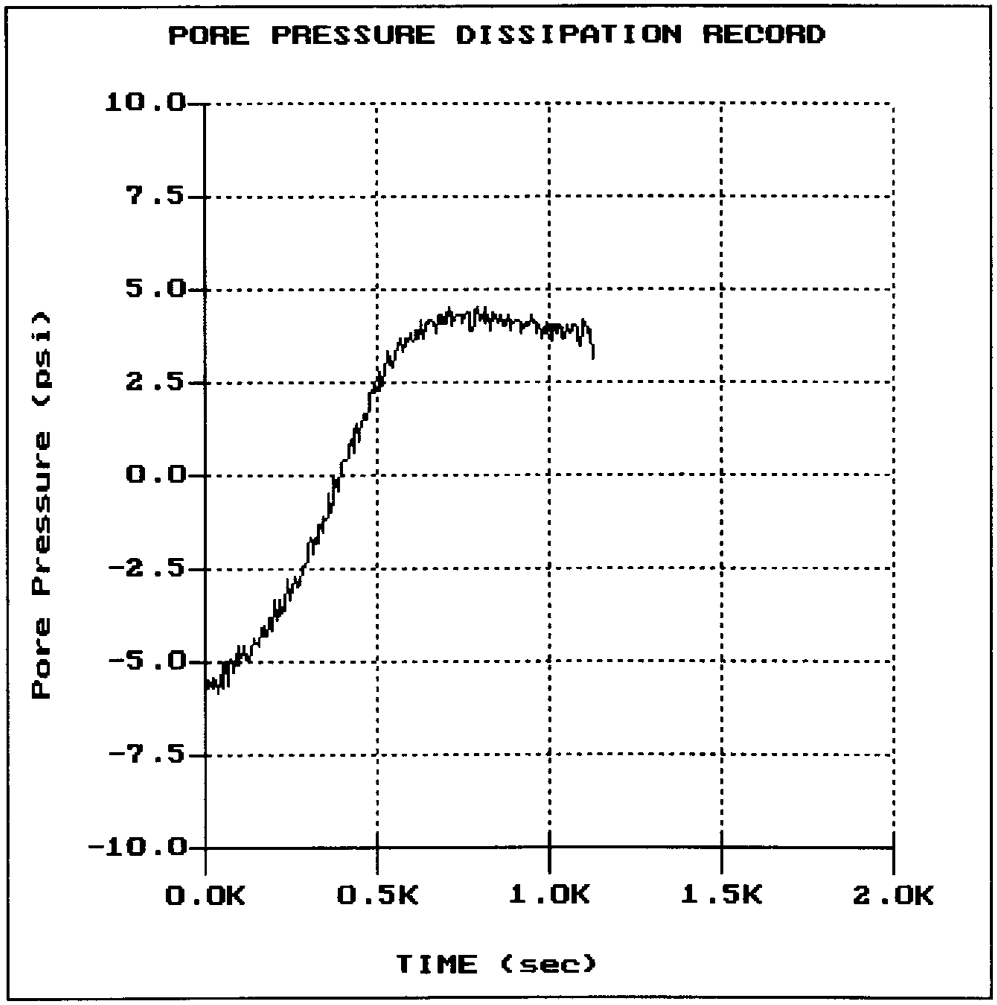
File: 108C12.PPR
Depth (m): 3.20
(ft): 10.50
Duration : 1345.0s



LFR LEVINE FRICKE

Hole:571-CP-01
Location:#571

Cone:20 TON ADO7
Date:11:04:98 12



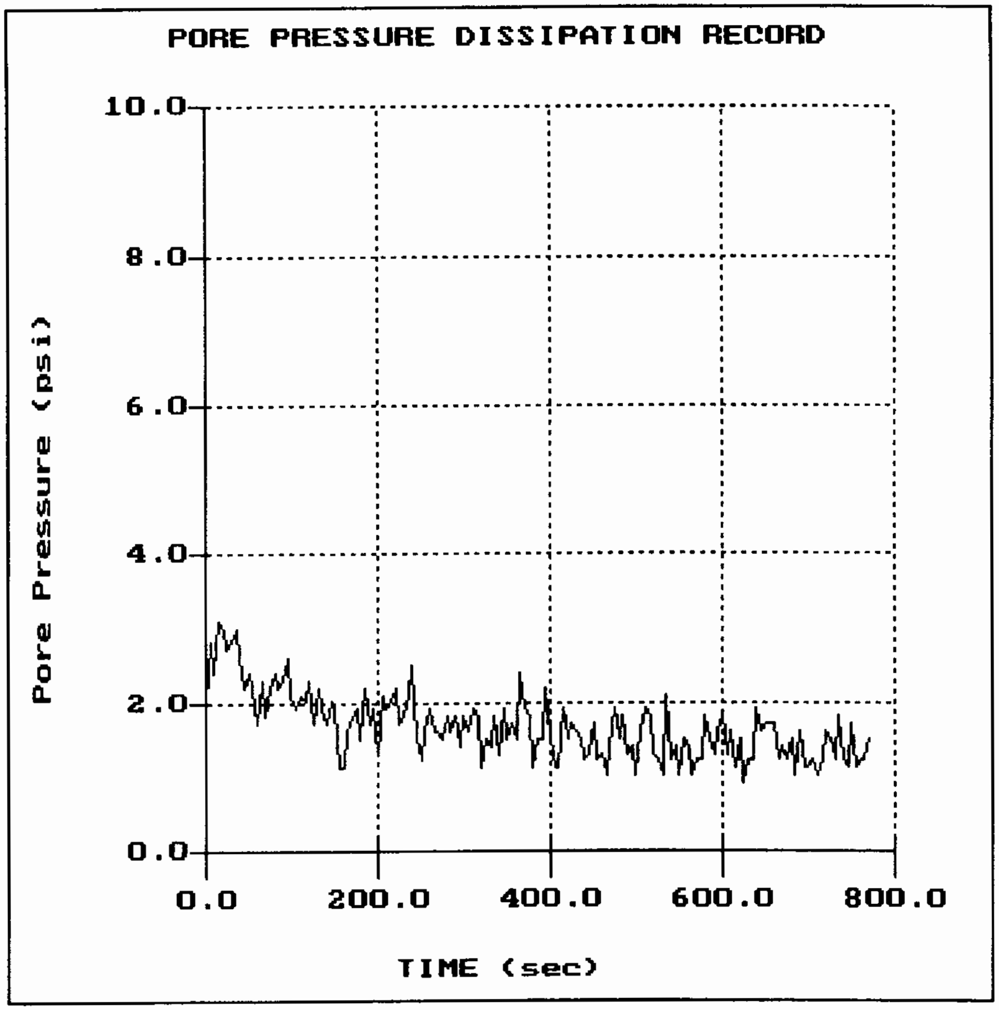
File: 108C12.PPR
Depth (m): 7.65
(ft): 25.10
Duration : 1125.0s

LFR LEVINE FRICKE

Hole:571-CP-02
Location:#571

Cone:20 TON AD071
Date:11:04:98 15:08

File: 108C14.PPR
Depth (m): 5.75
(ft): 18.86
Duration : 770.0s

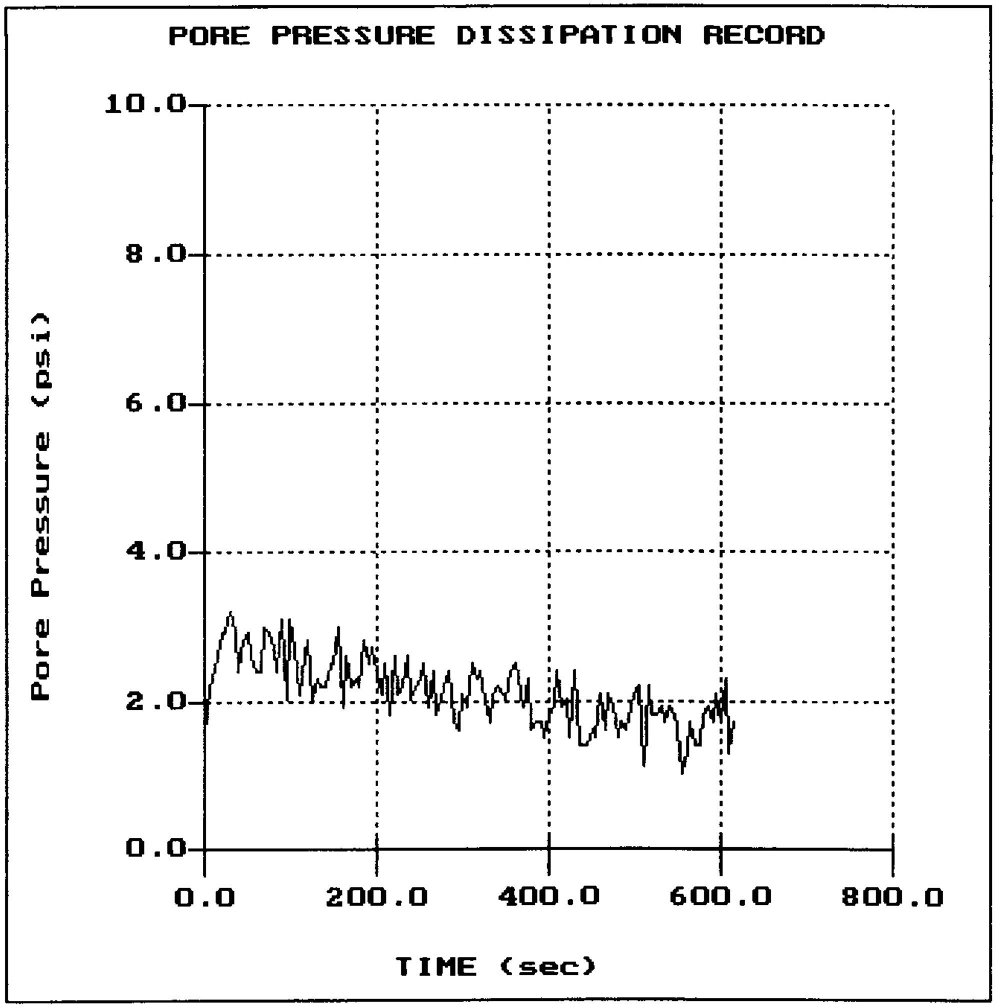


LFR LEVINE FRICKE

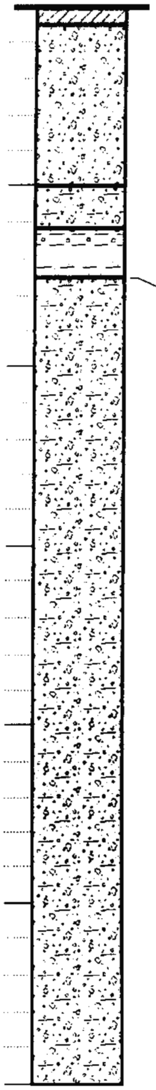
Hole:571-CP-03
Location:#571

Cone:20 TON AD071
Date:11:04:98 14:14

File: 108C13.PPR
Depth (m): 5.85
(ft): 19.19
Duration : 615.0s



SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
0			ASPHALT Surface.
			Coarse gravel.
5			SILTY SANDY GRAVEL (GM), yellowish brown, moist, dense, subangular, 20% silt, well graded. GRAVELLY SANDY SILT (ML), grayish olive, moist, soft. SILTY SAND (ML), yellowish brown, moist, fine grained, distinct interval, loose. SILTY SANDY GRAVEL (GM), yellowish brown, moist, dense to very dense, mixed heterogenous, well graded angular gravel and sand, varied color, gray to reddish brown, 15% silt.
10		Poor recovery	
15			20% silt, wet.
20			Gravel, as above. Highly weathered gravel and cobbles, friable.
		Poor recovery	
25			SILTY SANDY GRAVEL (GM), hard, heterogenous, variegated color and composition, 20% silt, trace clay. Coarse subangular weathered gravel and cobbles, wet.
30			BOTTOM OF BORING AT 30 FEET.
35			

Sample Interval

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 30, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

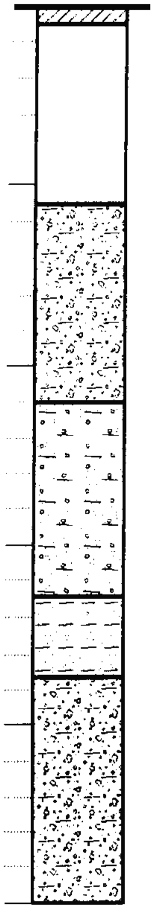
▼ Water level at time of drilling

LFR LEVINE•FRICKE

LITHOLOGY FOR 571-BH-01 *(page 1 of 1)*

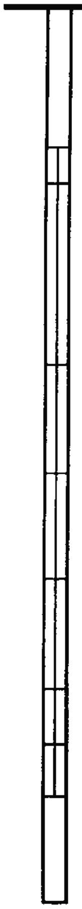
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
0			ASPHALT Surface.
5			
		0.0	SILTY SANDY GRAVEL (GM), mixed brownish yellow and reddish brown in olive-brown matrix with some bluish gray clasts, slightly moist, hard heterogenous, angular, well graded to more than 5 centimeters, 20% silt.
		Poor recovery	
10		0.0	Recovered samples indicate gravel as above, dry.
			GRAVELLY SILTY SAND (SM), grayish brown, moist, medium dense, 30% silt, well graded coarse material, subround to subangular, high percentage of fine-grained sand.
		0.0	
15			
		0.0	SILTY SAND (SM), grayish brown, saturated, dense, very poorly graded, fine grained, subrounded, some gravel, trace clay, 10% silt.
			SILTY SANDY GRAVEL (GM), mixed red-brown to gray-brown, slightly moist, hard, heterogenous, angular and subangular. Wet, loose at 19 feet. Moist, hard at 20 feet.
20		0.0	
25			BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 9/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 1, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

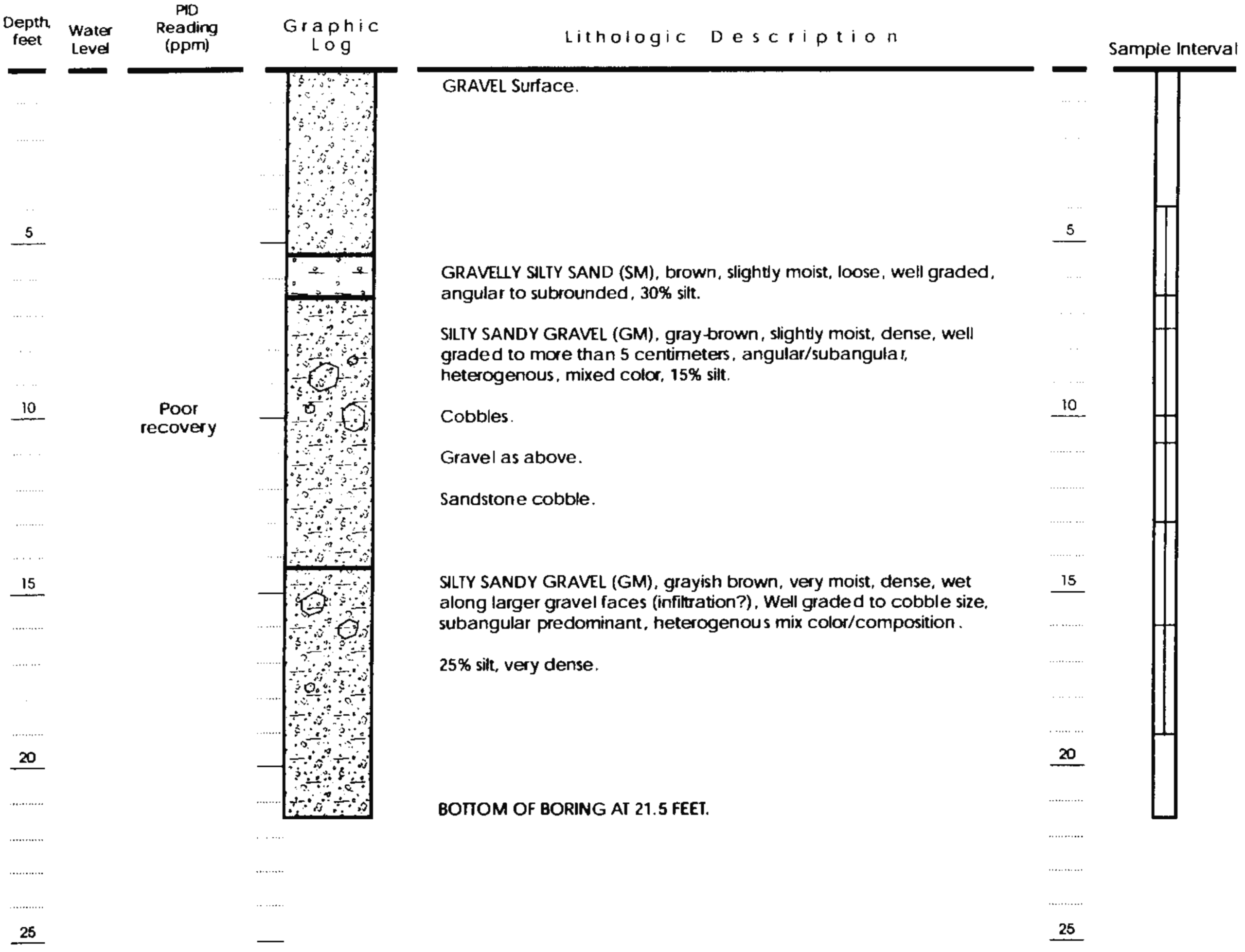
EXPLANATION

☰	Clay
⚋	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



GRAVEL Surface.

GRAVELLY SILTY SAND (SM), brown, slightly moist, loose, well graded, angular to subrounded, 30% silt.

SILTY SANDY GRAVEL (GM), gray-brown, slightly moist, dense, well graded to more than 5 centimeters, angular/subangular, heterogenous, mixed color, 15% silt.

Cobbles.

Gravel as above.

Sandstone cobble.

SILTY SANDY GRAVEL (GM), grayish brown, very moist, dense, wet along larger gravel faces (infiltration?), Well graded to cobble size, subangular predominant, heterogenous mix color/composition.

25% silt, very dense.

BOTTOM OF BORING AT 21.5 FEET.

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 1, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

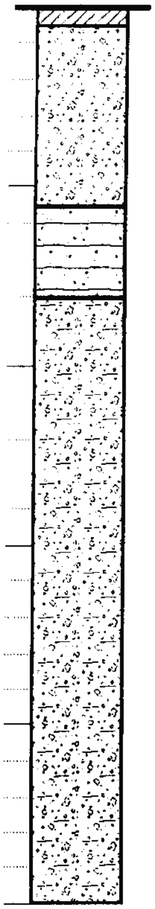
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 571-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval
				ASPHALT Surface.	
				Collapsing GRAVELS.	
5					
				CLAYEY GRAVELLY SAND (SC), yellowish brown, multicolored gray to yellow to reddish brown, moist, medium dense, well graded, angular, 10% clay.	
				SILTY SANDY GRAVEL (GM), multicolored as above, moist, dense, 15% silt, well graded to more than 5 centimeters, angular.	
10					
				Olive-brown uniform color.	
				Yellowish brown, very dense, multicolored.	
15				Clayey interval.	
				Gravel as above.	
20				Clayey interval.	
				Gravel as above.	
25				BOTTOM OF BORING AT 25 FEET.	
30					
35					

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 9/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 30, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

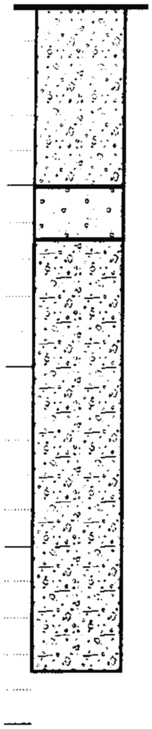
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 571-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
0			GRAVEL Surface.
5			GRAVELLY SAND (SP), brown, moist, loose, very fine grained, some silt.
		0.0	SILTY SANDY GRAVEL (GM), brown, very moist, hard, well graded, subangular, 30% silt, fine sand, gravel to 3 centimeters, subangular/angular.
		0.0	SILTY SANDY GRAVEL (GM), yellowish brown with reddish brown flakes, slightly moist, hard, well graded, angular, heterogenous, 10% silt.
10		0.0	Very moist with depth.
		0.0	Saturated zone at approximately 13.5 feet.
15			
			BOTTOM OF BORING AT 18.5 FEET.
20			
25			
30			
35			

Sample Interval

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 1, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
▤	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

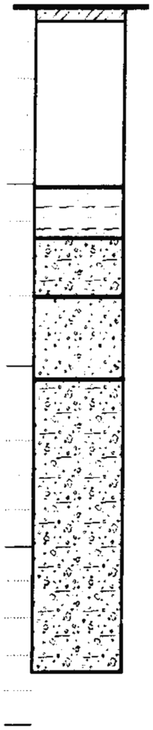
LITHOLOGY FOR 571-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

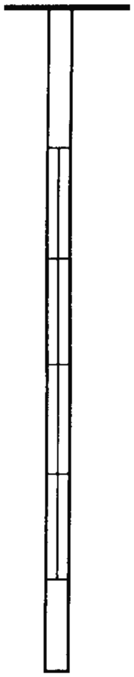
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Surface, approximately 2" thick.
5			
		0.0	SILTY SAND (SM), dark brown, moist, loose, fine grained, subangular, trace gravel.
		Poor recovery	SILTY SANDY GRAVEL (GM), yellowish brown and grayish brown, slightly moist, medium dense, 15% silt, well graded, angular, heterogenous.
		0.0	SANDY GRAVEL (GW), grayish brown, moist, loose, well graded, subangular, 30% fine sand, less than 10% silt.
10			
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, moist, hard, heterogenous mixed composition/color, well graded to cobble size, 20% silt.
		0.0	Siltier, very moist. Saturated at 13.5 feet, wet along gravel faces.
15			
			BOTTOM OF BORING AT 18.5 FEET.
20			
25			
30			
35			

Graphic Log



Sample Interval



REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 1, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

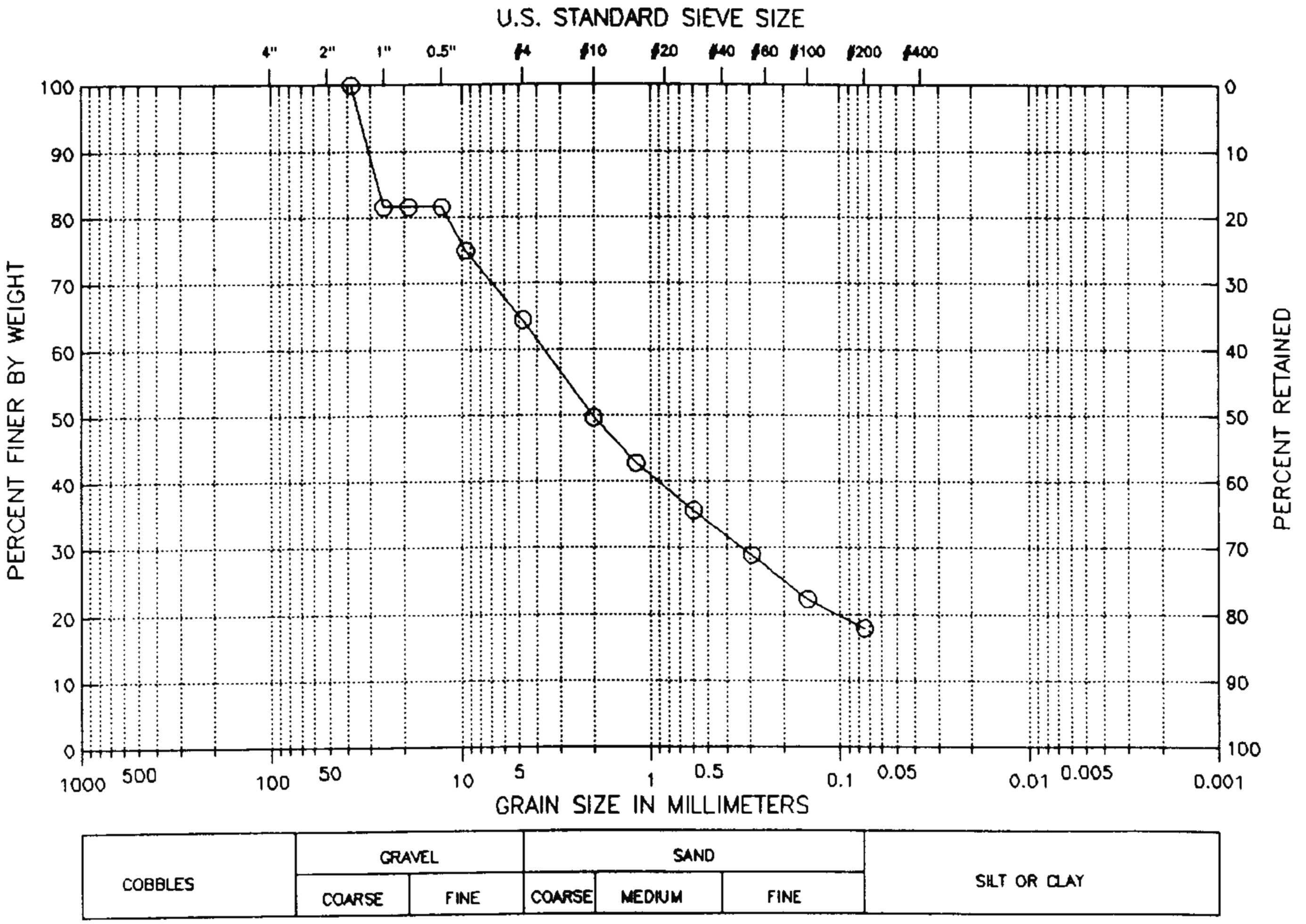
EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

	Boring No. : 571-BH-06 Sample No.: 11.0-11.5 SO Tested by : C. WASON Filename : 571-11	Project : LEVINE FRICKE RECON 6730.00-024 Project No.: 16148A Location: SCVWD MTBE Date : Wed Dec 16 1998



Classification :

Remarks :
Depth: 11.0-11.5 feet

Visual Description :
GRAY BROWN GRAVELLY SAND

Figure 1

URS Greiner Woodward Clyde

```
Wed Dec 16 10:41:37 1998                                                  Page :  1

                              GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                     Filename : 571-11
Project No. : 16148A              Depth : 11.0-11.5 FT.        Elevation : NA
Boring No. : 571-BH-06            Test Date : 12/16/98         Tested by : C. WASON
Sample No. : 11.0-11.5 SO         Test Method : ASTM D422      Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : GRAY BROWN GRAVELLY SAND
Remarks : Depth: 11.0-11.5 feet

                              COARSE SIEVE SET
Sieve         Sieve Openings        Weight      Cumulative         Percent
Mesh          Inches  Millimeters   Retained    Weight Retained    Finer
                                    (gm)        (gm)               (%)
----------    ------  -----------   --------    ---------------    -------
1.5"           1.500     38.10         0.00               0.00        100
1"             1.012     25.70        30.05              30.05         82
0.75"          0.748     19.00         0.00              30.05         82
0.5"           0.500     12.70         0.00              30.05         82
0.375"         0.374      9.51        11.02              41.07         75
#4             0.187      4.75        17.07              58.14         65
#10            0.079      2.00        24.27              82.41         50
#16            0.047      1.19        11.37              93.78         43
#30            0.023      0.60        11.77             105.55         36
#50            0.012      0.30        10.99             116.54         29
#100           0.006      0.15        10.72             127.26         22
#200           0.003      0.07         7.08             134.34         18
    Total Dry Weight of Sample = 163.84

 D85 : 27.6110 mm
 D60 : 3.6493 mm
 D50 : 2.0352 mm
 D30 : 0.3320 mm
 D15 : N/A
 D10 : N/A

 Soil Classification
       ASTM Group Symbol    : N/A
       ASTM Group Name      : N/A
       AASHTO Group Symbol  : A-1-b(0)
       AASHTO Group Name    : Stone Fragments, Gravel and Sand
```

Wed Dec 16 10:41:37 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 571-11
Project No. : 16148A	Depth : 11.0-11.5 FT.	Elevation : NA
Boring No. : 571-BH-06	Test Date : 12/16/98	Tested by : C. WASON
Sample No. : 11.0-11.5 SO	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : GRAY BROWN GRAVELLY SAND

Remarks : Depth: 11.0-11.5 feet

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 571-11	218.80	392.52	382.64	6.03

Average Moisture Content = 6.03

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 586

Chevron #9-0699
45 West El Camino Real
Mountain View, California 9404C

May 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Mountain View Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to approximately 50 to 58 feet below ground surface (bgs) with interbedded sands and gravels. Groundwater was encountered at approximately 60 feet bgs.

SYSTEM DESCRIPTION

The UST system at the site consists of three 12,000-gallon double-walled gasoline USTs constructed of fiberglass with double-walled fiberglass piping. The UST system utilizes both electronic line leak detection and continuous interstitial monitoring for piping leak detection and continuous interstitial monitoring for the UST leak detection.

RESULTS

MtBE was detected in 1 of 22 soil-gas samples at a concentration of 0.026 μg/l, and in 1 of 14 soil samples at a concentration of 6.9 ug/kg. MtBE was not detected in groundwater samples collected at this site. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in a few of the soil-gas and soil samples, and all of the groundwater samples. TPH as gasoline was detected at a concentration of 12 mg/l in one groundwater sample.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Closed 1/97. MtBE not detected in groundwater at time of closure.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes
Release date:	1/1/89
Fuel released:	gasoline
Location:	Former UST complex
Quantity (gallons):	Unknown
Data available:	Yes

Comments:

Site received closure in 1/97 after UST system replacement, site investigation, and remedial action.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes
Date of last test:	Within 6 months of the inspection
Method of tank testing:	Automatic tank gauging
Tank leak rate (gallons/hour):	<0.1
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid probe
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approx.3 years; 8 years since first upgrade (tanks/pipes)
Years of operation as fueling facility:	Approximately 34 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Monitoring system functionally tested during inspection.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	None maintained
Personnel training:	Very good. Personnel were very knowledgeable of the system.

Comments:

The site appears to be very clean. Sumps and overspill containment was dry.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To storm drains
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drains
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Service bay?
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Counted nine well lids, possibly more. Groundwater may be approximately 60 to 70 feet.

NO FORM B INFORMATION LOCATED DURING FILE REVIEW

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #586
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
586-SG-01	11/19/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		28	<5	<100	<1	<1	<1	<1	<1	
586-SG-02	11/19/98	5	<5	<100	<1	<1	<1	<1	1.3	
		12	<5	<100	<1	<1	<1	<1	<1	
		28	<5	<100	<1	<1	<1	<1	<1	
586-SG-02-DUP		28	<5	<100	<1	<1	<1	<1	<1	
586-SG-03	11/19/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
586-SG-04	11/20/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
586-SG-04-SPL		12	0.026	NA	0.0084	0.033	0.0071 J	0.026	0.0088 J	(a)
586-SG-05	11/20/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
586-SG-06	11/20/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	1.2	<1	<1	<1	
586-SG-07	11/20/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
586-SG-07-DUP		12	<5	<100	<1	<1	<1	<1	<1	
586-SG-08	11/20/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		28	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:
(a) Other analytes detected: Ethanol (0.014 ug/L)
All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #586
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
586-BH-02	12/02/98	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.5-24.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
586-BH-03	12/02/98	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.0-25.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
586-BH-04	12/03/98	5.0-5.5	<5	<1	<5	19	<5	7.4	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.0-25.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
586-BH-05	12/03/98	13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		31.5-32.0	6.9	<1	<5	19	<5	<5	<5	<20	<20	<20	<200
586-BH-06	12/03/98	7.0-7.5	<5	<1	<5	15	<5	<5	<5	<20	<20	<20	<200
		11.5-12.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.5-23.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 586
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
586-BH-01	12/02/98	59.0-61.0	<0.5	<0.05	2	5.9	0.65	1.8	0.53	<1	<1	<1	<10
586-BH-01-DUP		59.0-61.0	<0.5	<0.05	1.5	4.4	0.51	1.4	<0.5	<1	<1	<1	<10
586-BH-05	12/03/98	59.0-61.0	<5	12	37	20	1200	580	350	<10	<10	<10	<100

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

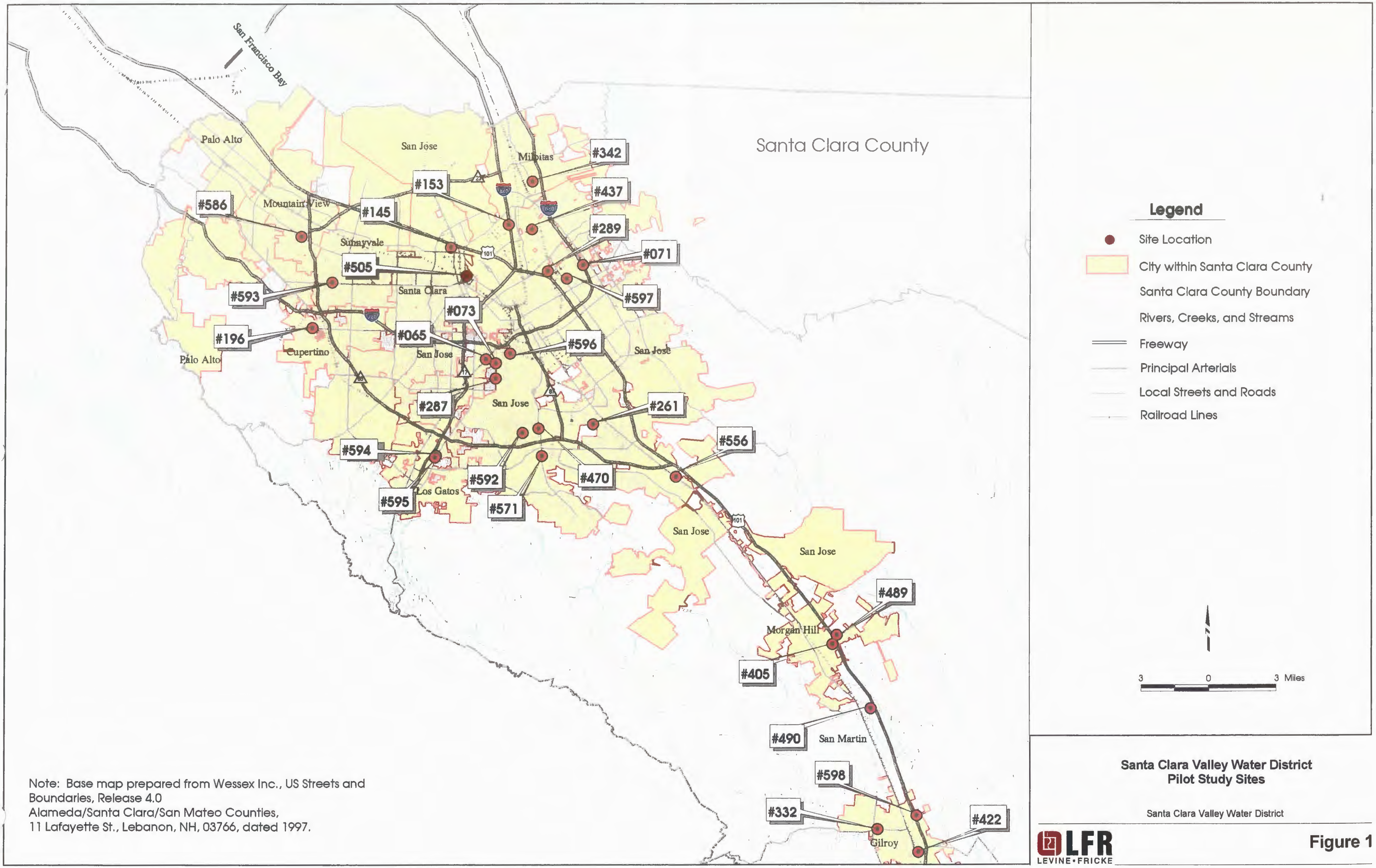
Table 4
Summary of Physical Parameters for Soil Samples - Site #586
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
586-BH-02	23.0 - 23.5	Brown sandy clay	0.08	19.77	124.3	103.8	38.38
586-BH-04	10.5 - 11.0	Brown sandy clay with gravel	0.14	18.84	120.6	101.5	39.74
586-BH-06	22.0 - 22.5	Brown gravelly sand	0.05	5.07	111.2	105.9	37.13

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



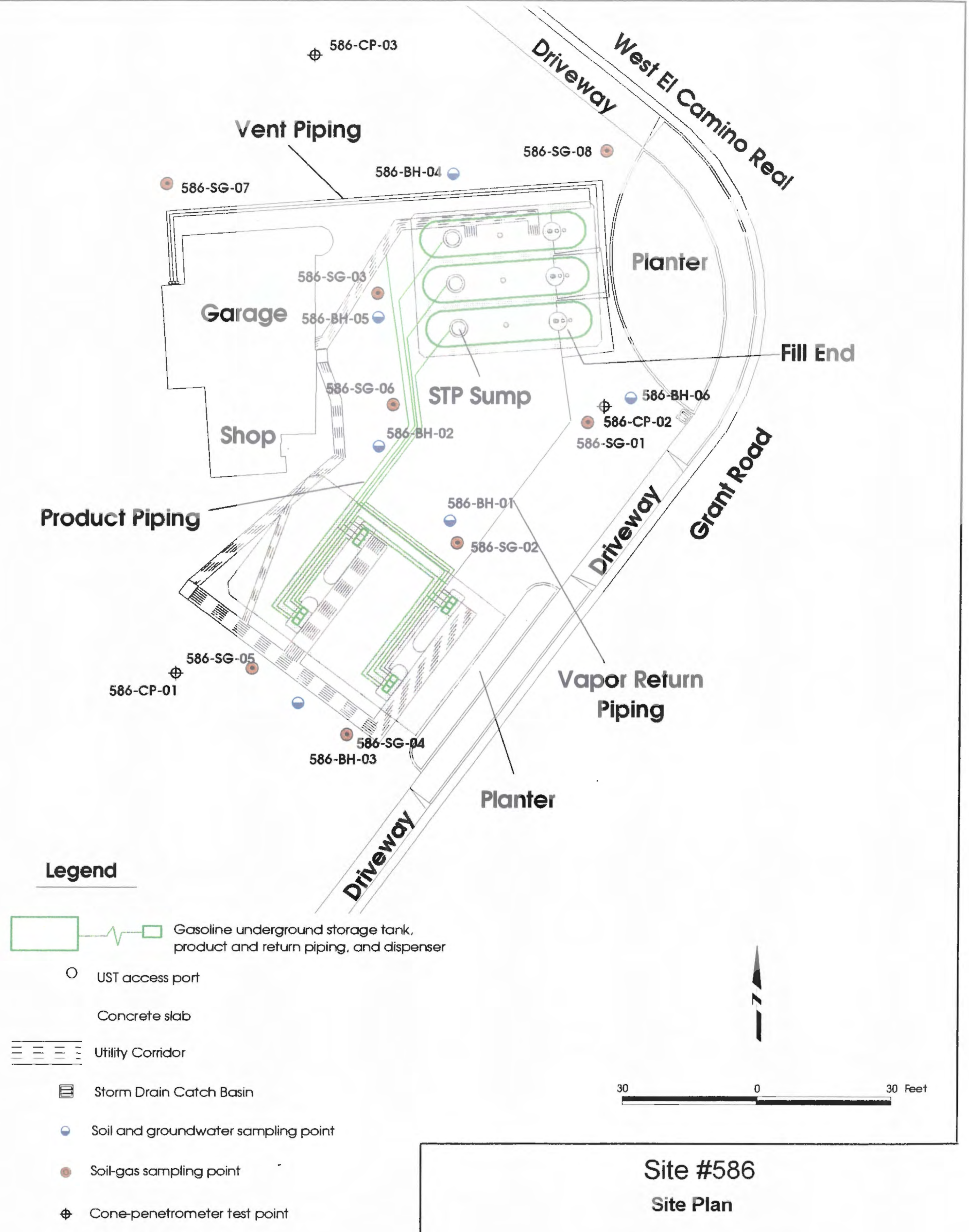
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



STP - Submersible Turbine Pump

Note: Base map prepared from an undated As-Built Plan, Gettler-Ryan Inc., Dublin, CA, 9-0699, 45 West El Camino Real, Mountain View, CA, Chevron, Northwest Region, by Robert H. Lee & Associates, Inc., of Petaluma CA.

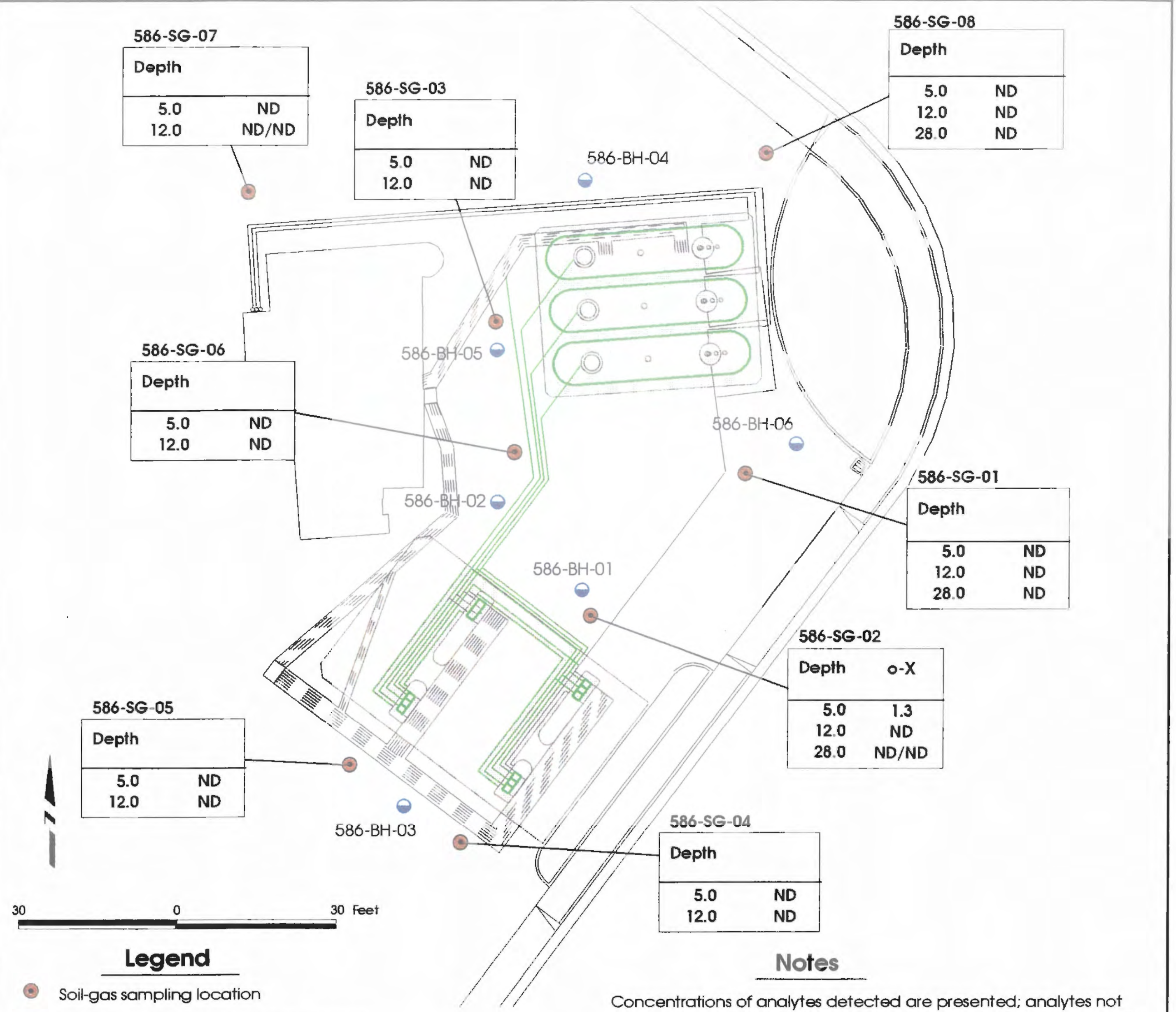
Site #586

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



Legend

● Soil-gas sampling location

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-SG-01

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

Utility Corridor

Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

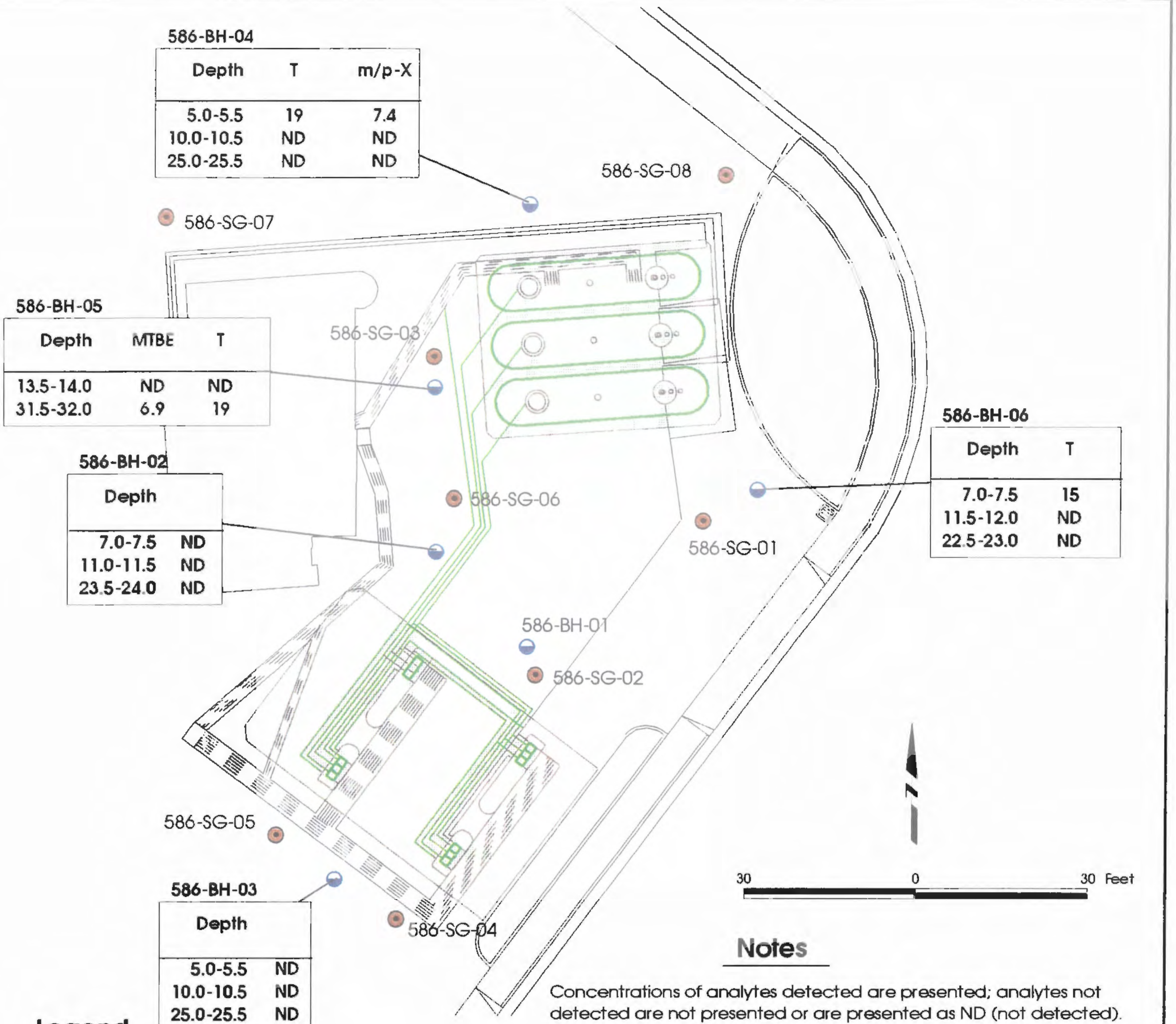
Site #586

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



586-BH-04

Depth	T	m/p-X
5.0-5.5	19	7.4
10.0-10.5	ND	ND
25.0-25.5	ND	ND

586-BH-05

Depth	MTBE	T
13.5-14.0	ND	ND
31.5-32.0	6.9	19

586-BH-02

Depth	
7.0-7.5	ND
11.0-11.5	ND
23.5-24.0	ND

586-BH-06

Depth	T
7.0-7.5	15
11.5-12.0	ND
22.5-23.0	ND

586-BH-03

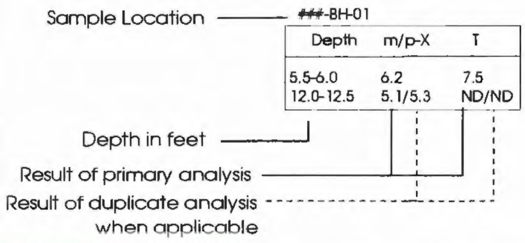
Depth	
5.0-5.5	ND
10.0-10.5	ND
25.0-25.5	ND

Legend

◐ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

⊟ Storm Drain Catch Basin

☰ Utility Corridor

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

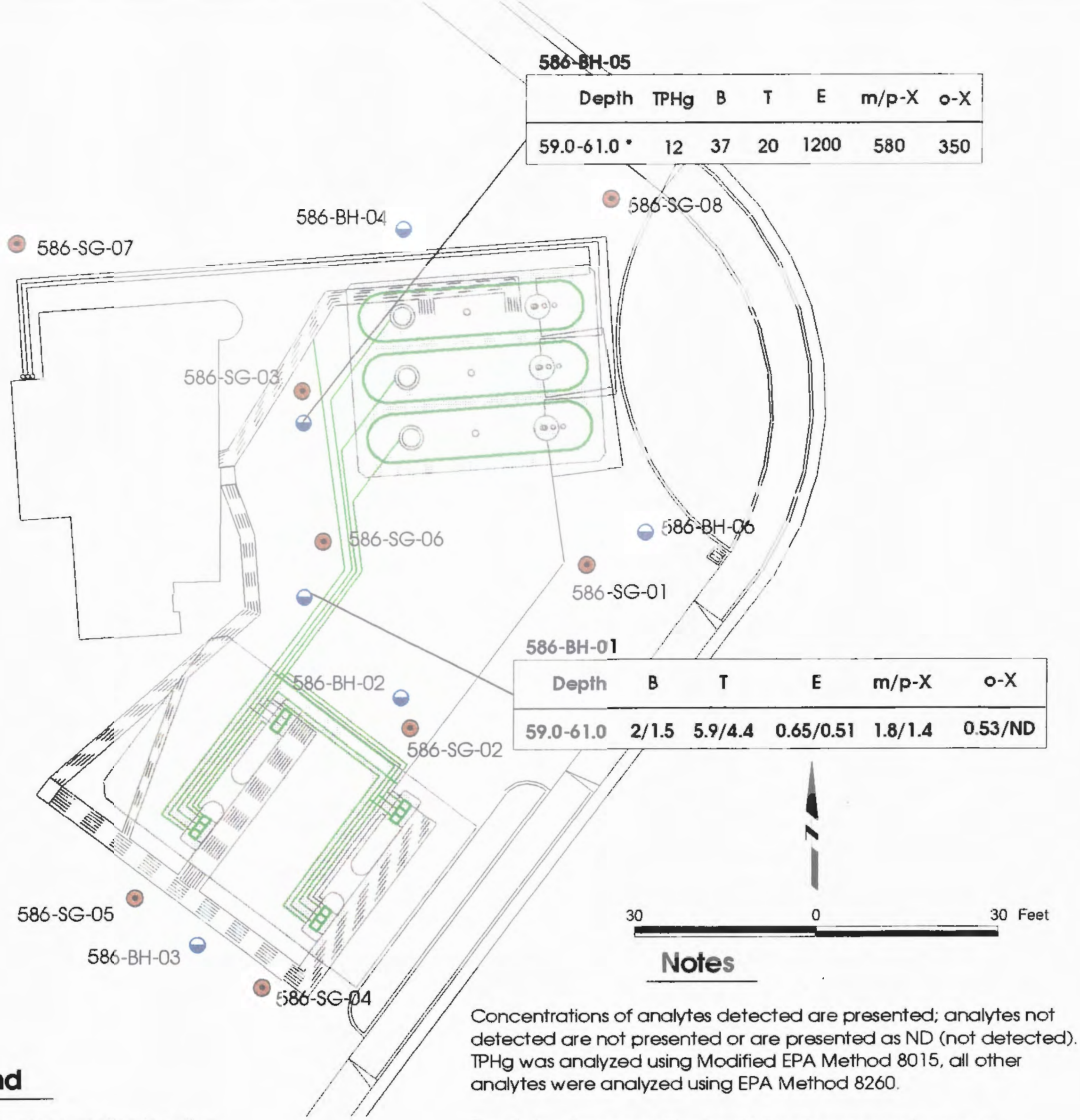
Site #586

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



586-BH-05

Depth	TPHg	B	T	E	m/p-X	o-X
59.0-61.0 *	12	37	20	1200	580	350

586-BH-01

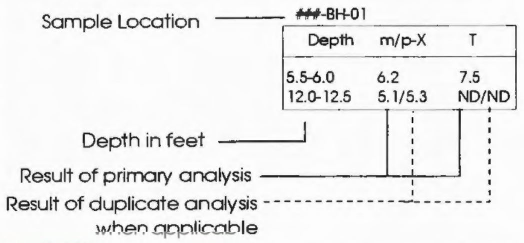
Depth	B	T	E	m/p-X	o-X
59.0-61.0	2/1.5	5.9/4.4	0.65/0.51	1.8/1.4	0.53/ND

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

Utility Corridor

Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

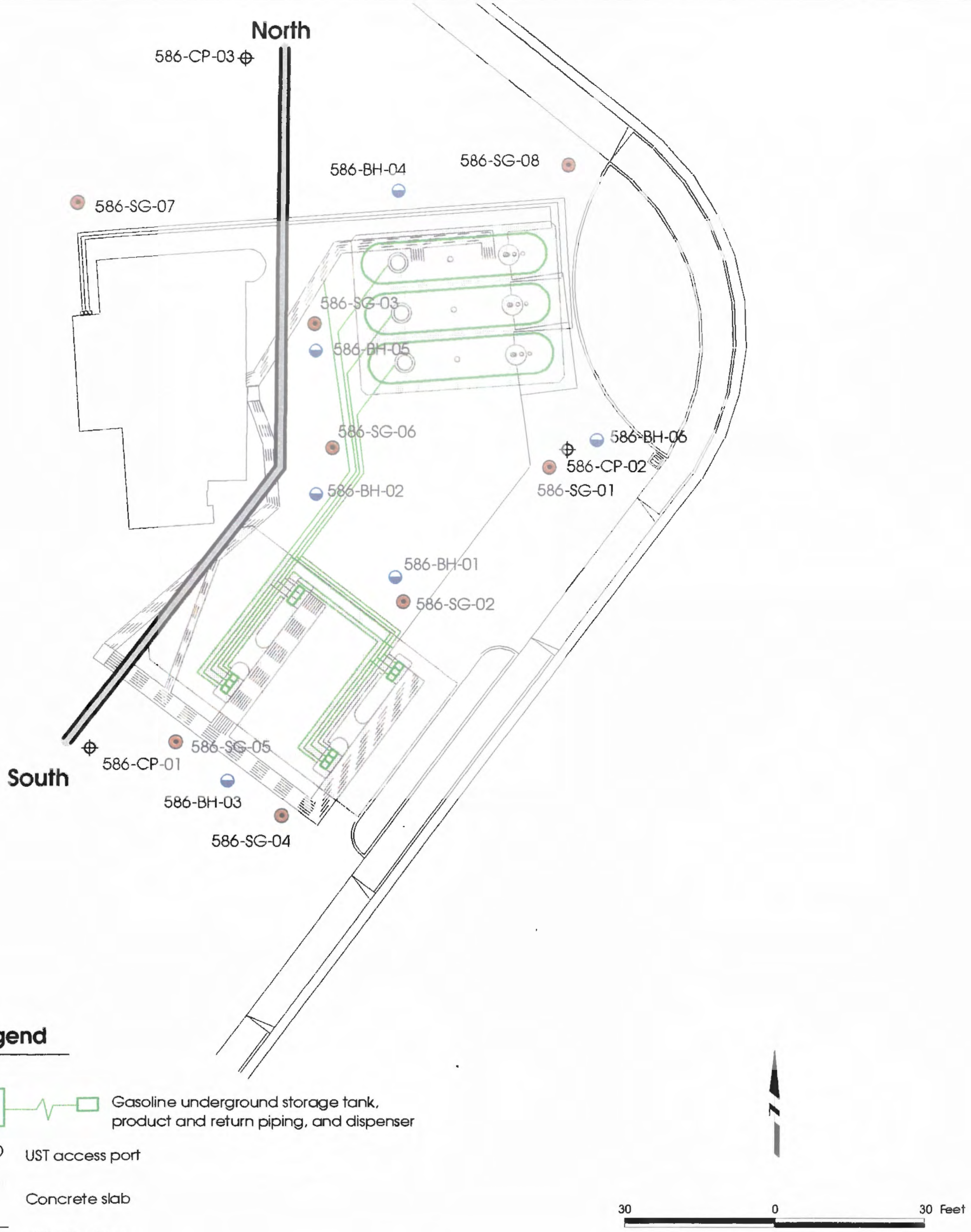
Site #586

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR LEVINE • FRICKE

Figure 5



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

Concrete slab

☰ Utility Corridor

▤ Storm Drain Catch Basin

● Soil and groundwater sampling point

● Soil-gas sampling point

⊕ Cone-penetrometer test point

See Figure 2 for description of site features and origin of base map.

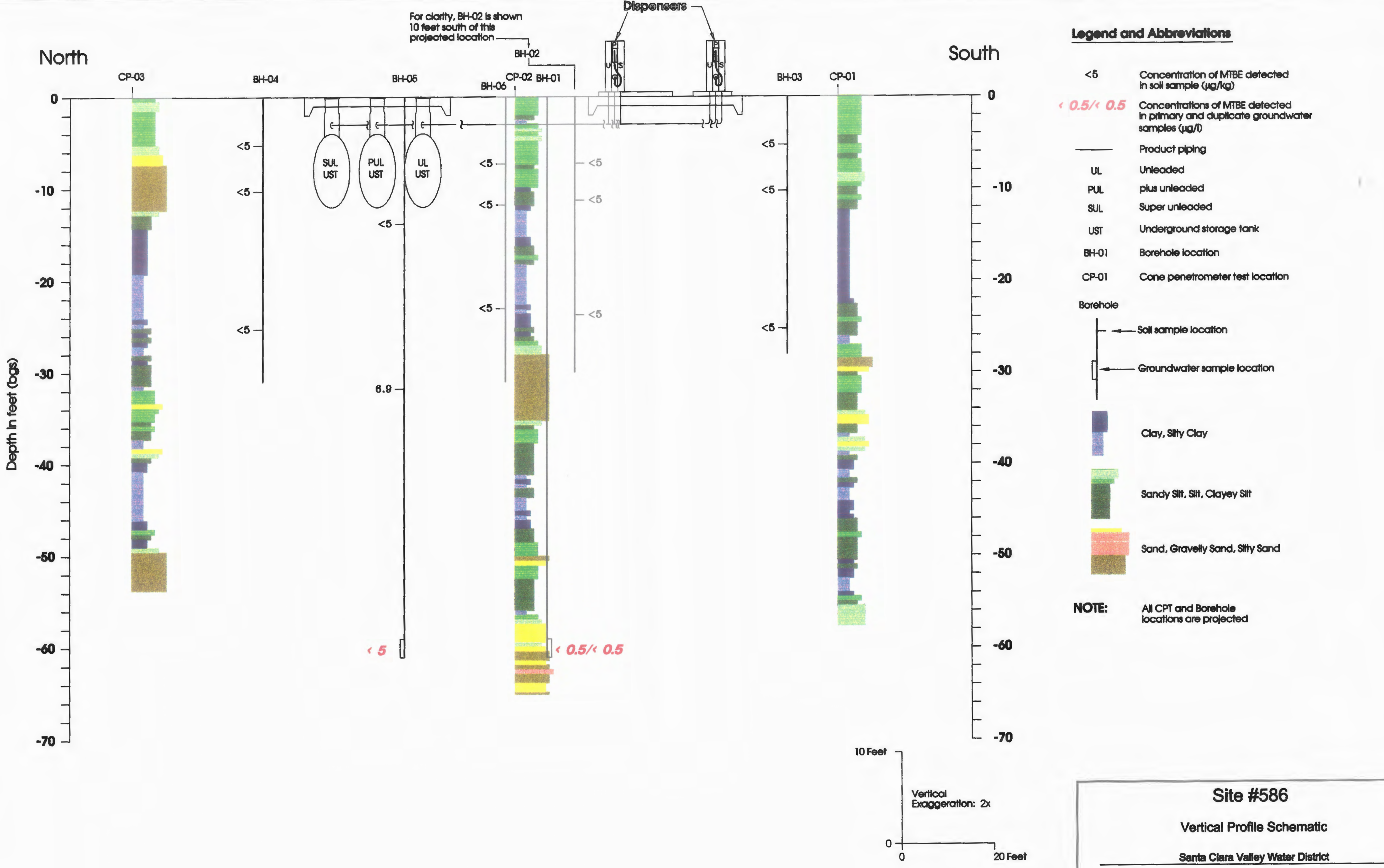
Site #586

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6


North
South
CP-03
BH-04
BH-05
BH-06
CP-02
BH-01
BH-02
BH-03
CP-01
For clarity, BH-02 is shown 10 feet south of this projected location
Dispensers
U
S
SUL UST
PUL UST
UL UST
<5
6.9
< 5
< 0.5/< 0.5
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
10 Feet
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
< 0.5/< 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Product piping
UL Unleaded
PUL plus unleaded
SUL Super unleaded
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected

J:\ENGCAD\6730\CM586.DWG 04/21/99 CM/505.PCP

Site #586

Vertical Profile Schematic

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

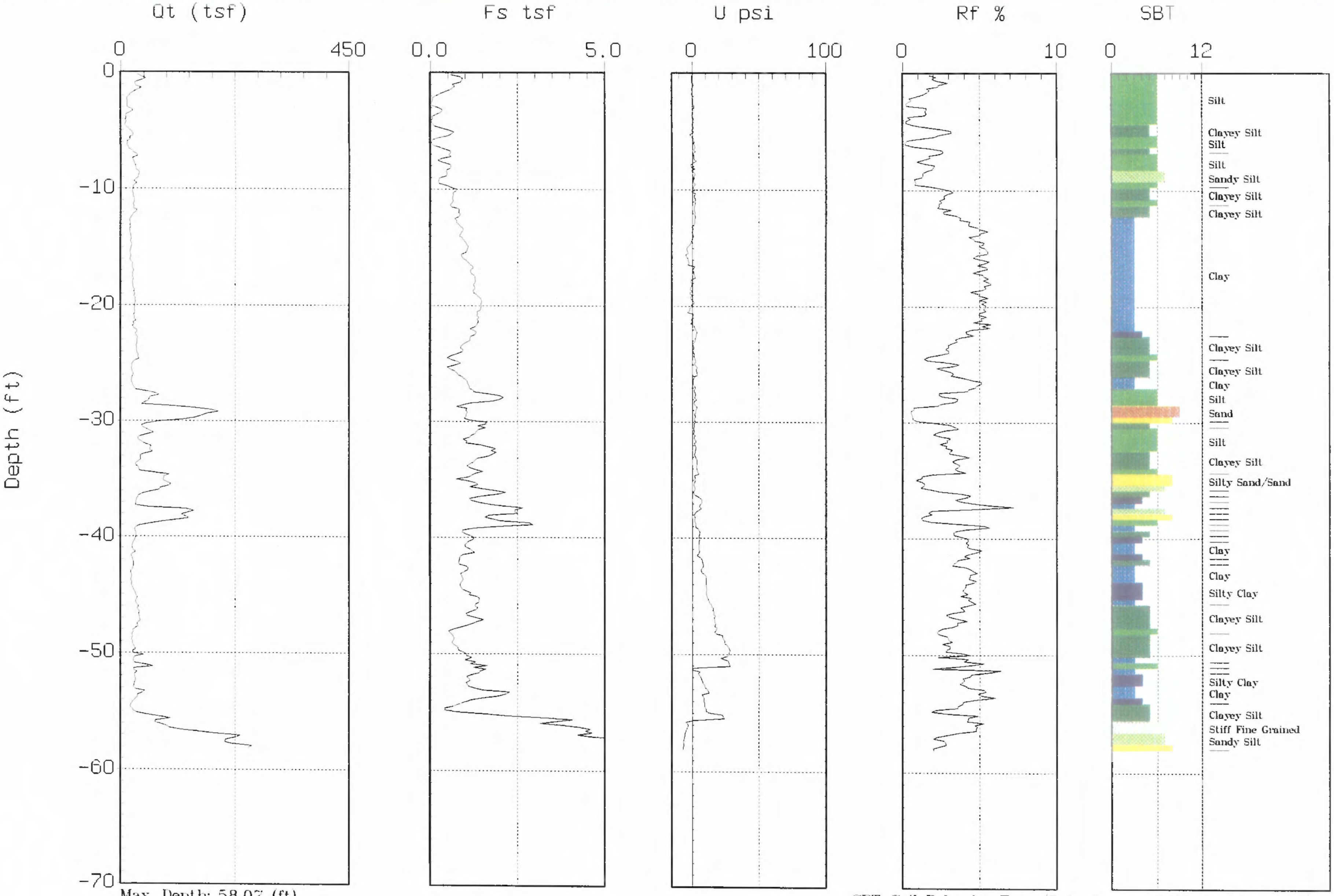
Figure 7

GREGG

LFR LEVINE.FRICKE

Site: 586
Location : 586-CP-01

Geologist: Todd Miller
Date : 1:05:98 15:08 G



Max. Depth: 58.07 (ft)

Depth Inc.: 0.164 (ft)

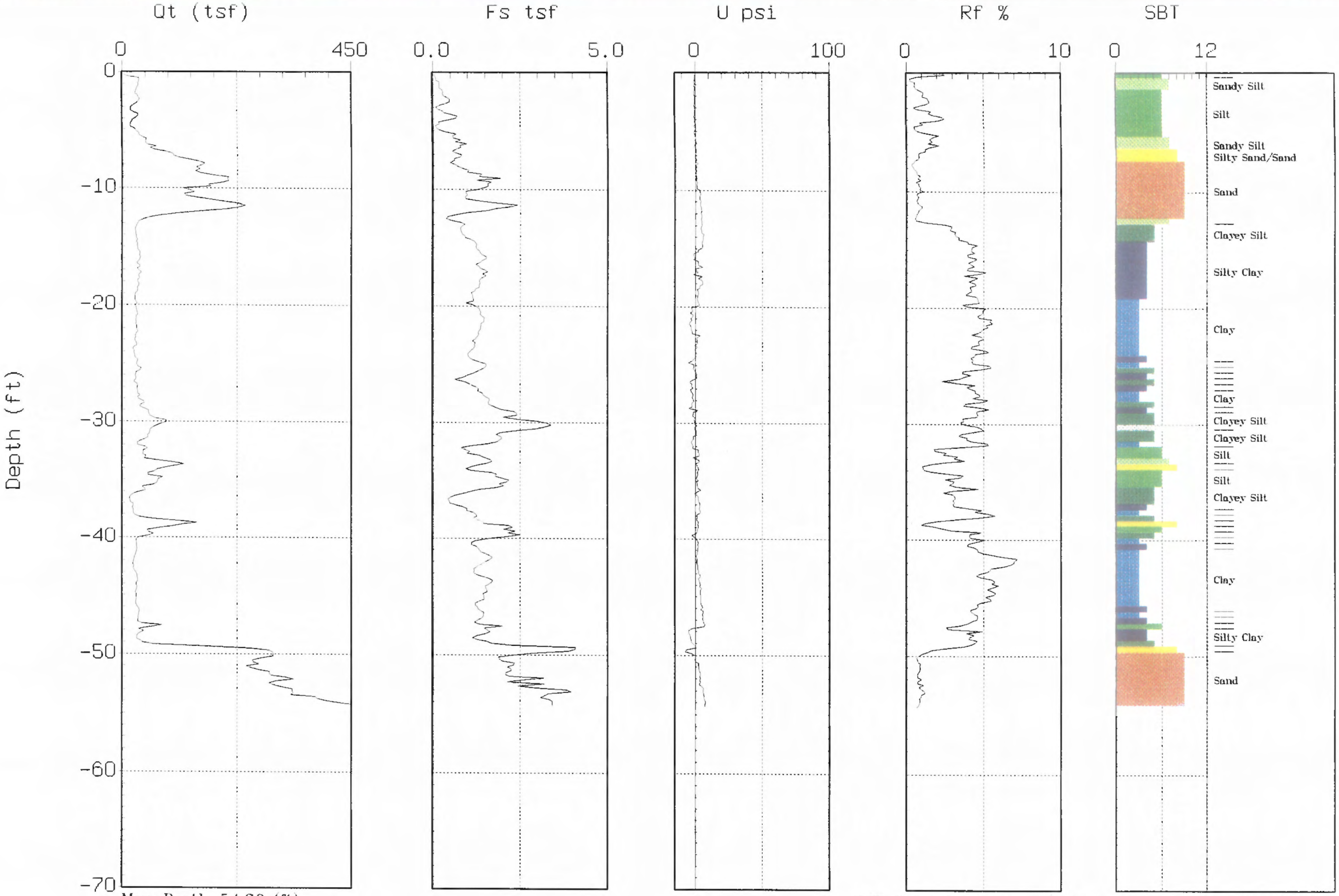
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #586
Location : 586-CP-03

Geologist: Todd Miller
Date : 11:05:98 19:28



Max. Depth: 54.30 (ft)

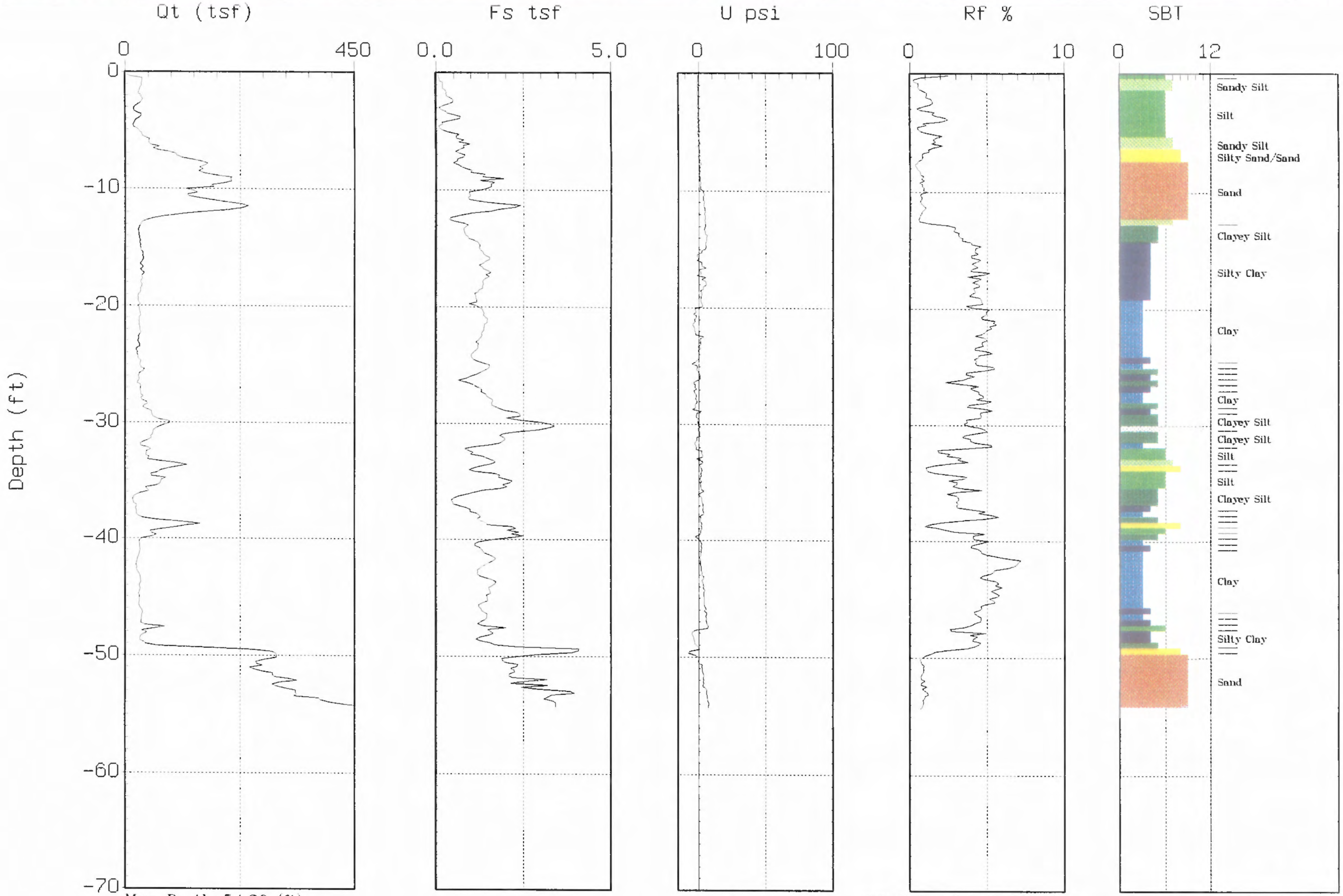
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: #586
Location : 586-CP-03

Geologist: Todd Miller
Date : 11:05:98 19:28



Max. Depth: 54.30 (ft)

Depth Inc.: 0.164 (ft)

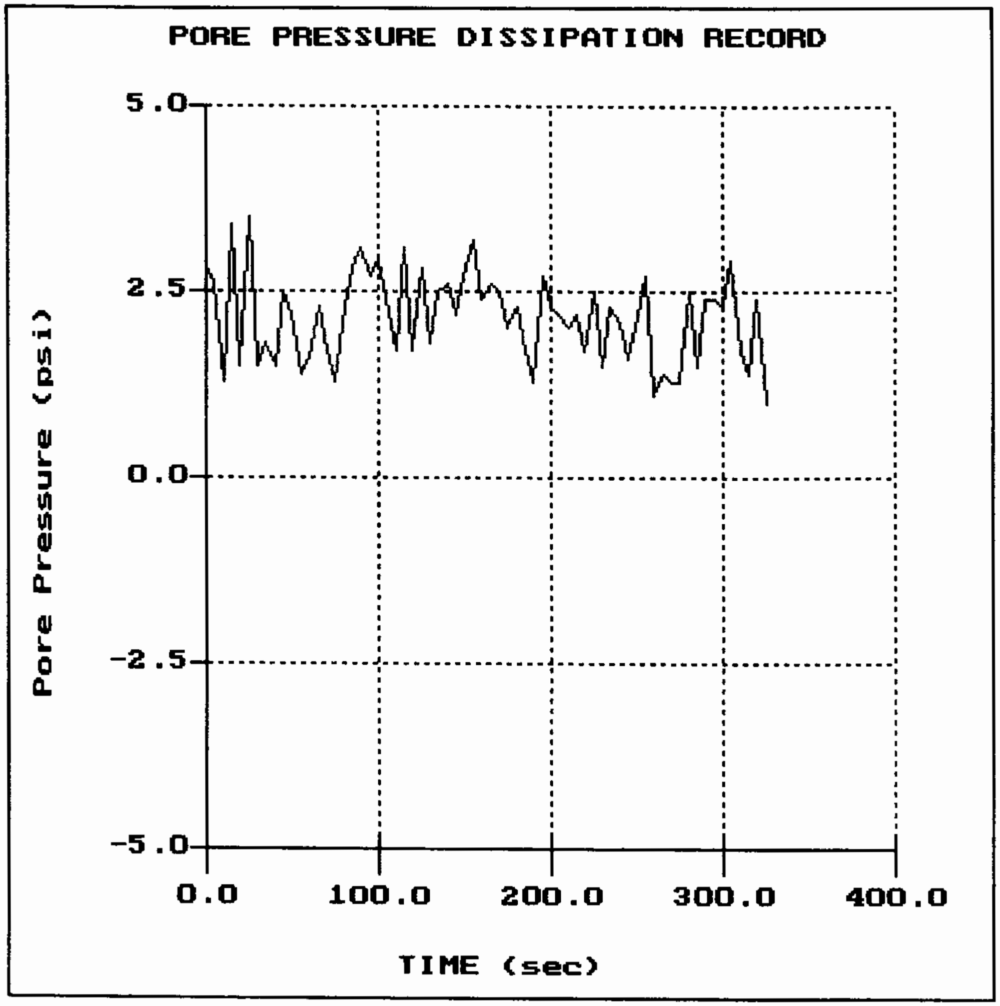
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:586-CP-01
Location:#586

Cone:20 TON AD071
Date:11:05:98 15:08

File: 108C18.PPR
Depth (m): 8.90
(ft): 29.20
Duration : 325.0s

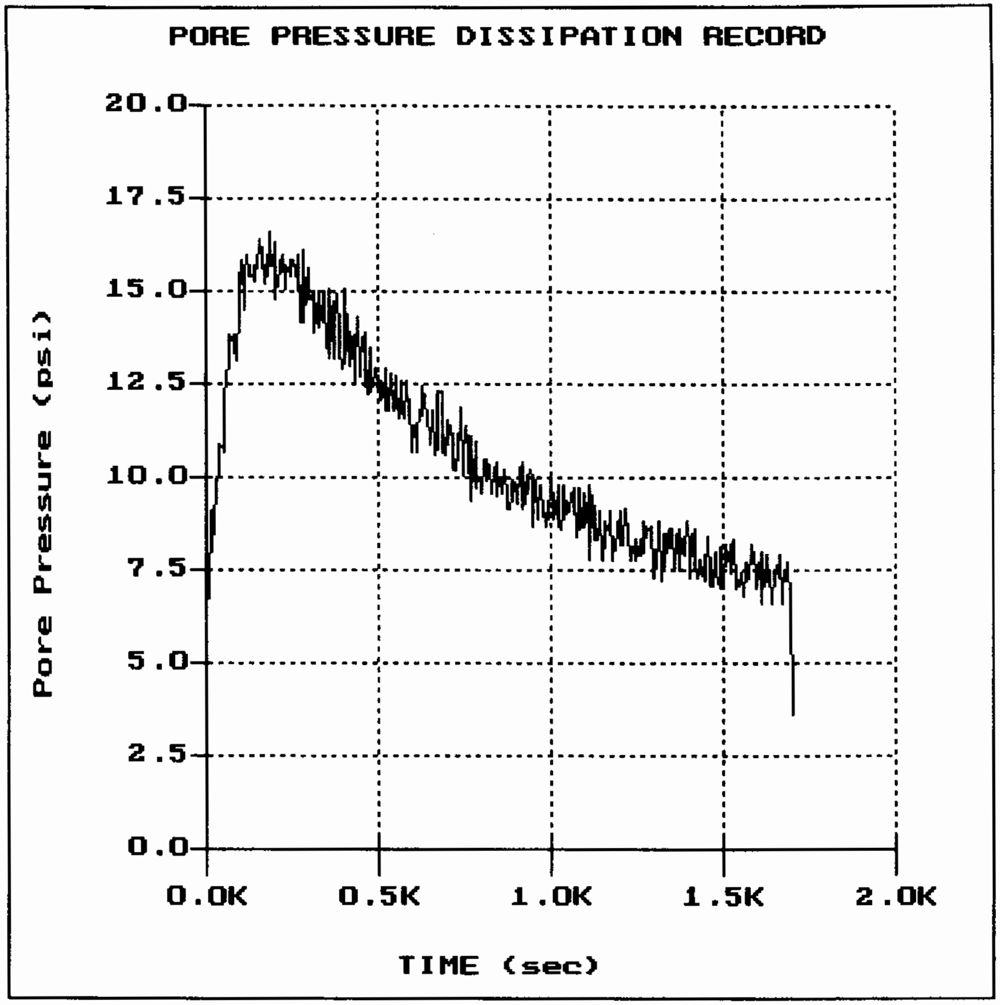


LFR LEVINE FRICKE

Hole:586-CP-01
Location:#586

Cone:20 TON AD071
Date:11:05:98 15:08

File: 108C18.PPR
Depth (m): 15.70
(ft): 51.51
Duration : 1700.0s

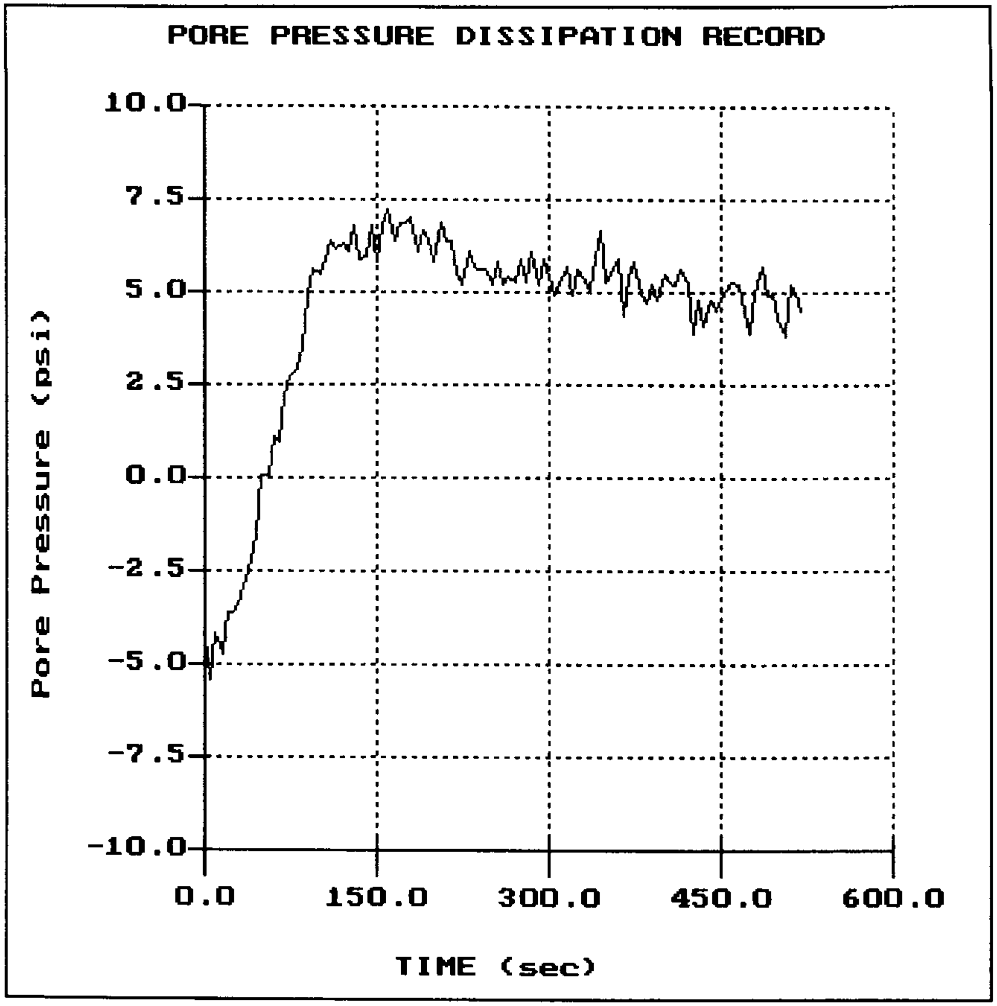


LFR LEVINE FRICKE

Hole:586-CP-01
Location:#586

Cone:20 TON AD071
Date:11:05:98 15:0

File: 108C18.PPR
Depth (m): 17.70
(ft): 58.07
Duration : 520.0s

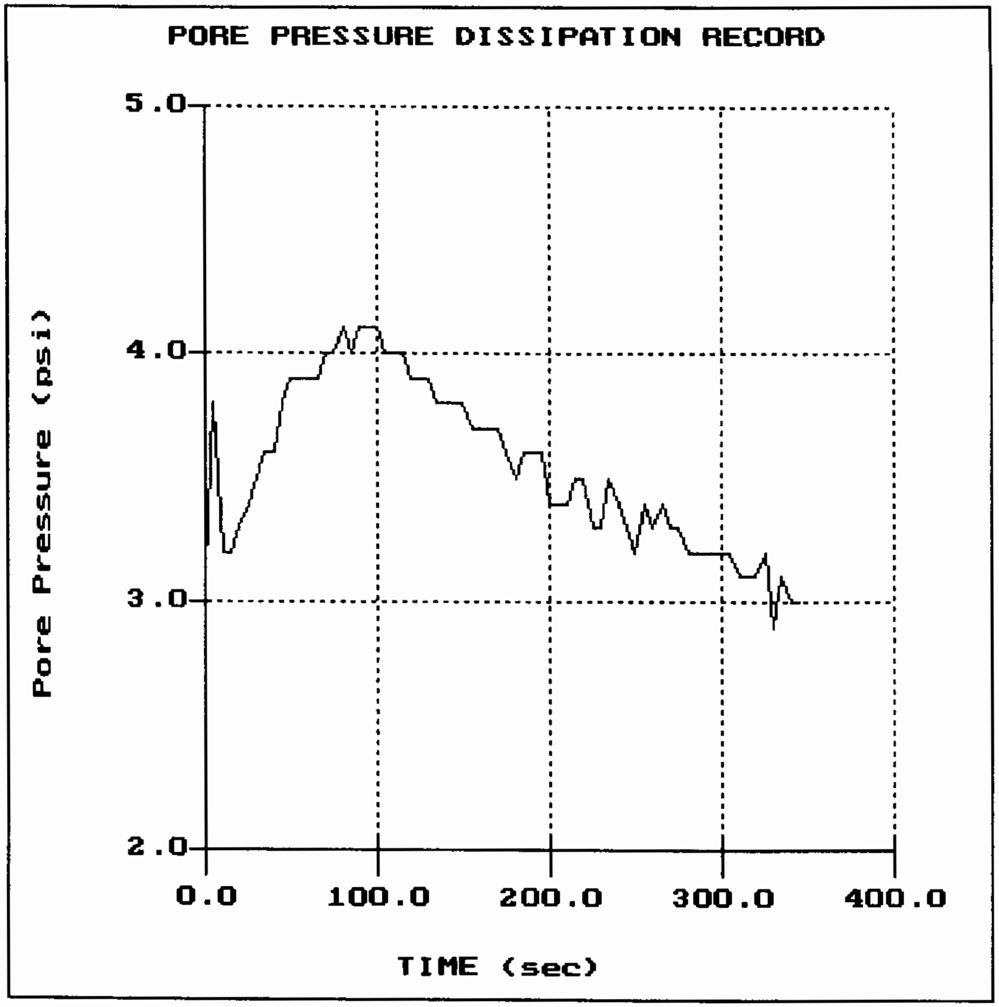

PORE PRESSURE DISSIPATION RECORD

LFR LEVINE FRICKE

Hole:586-CP-02
Location:#586

Cone:20 TON AD071
Date:11:05:98 17:05

File: 108C19.PPR
Depth (m): 17.75
(ft): 58.23
Duration : 345.0s

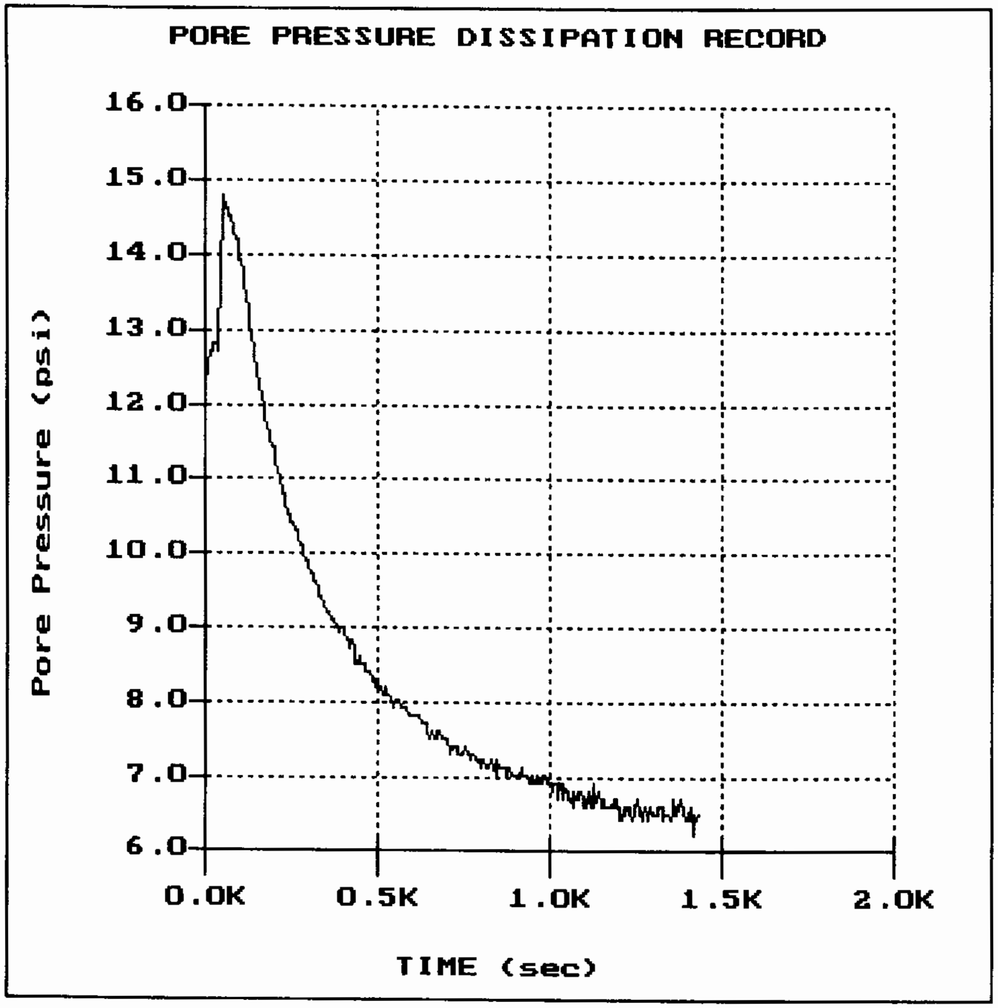


LFR LEVINE FRICKE

Hole:586-CP-02
Location:#586

Cone:20 TON AD071
Date:11:05:98 17:05

File: 108C19.PPR
Depth (m): 19.90
(ft): 65.29
Duration : 1430.0s

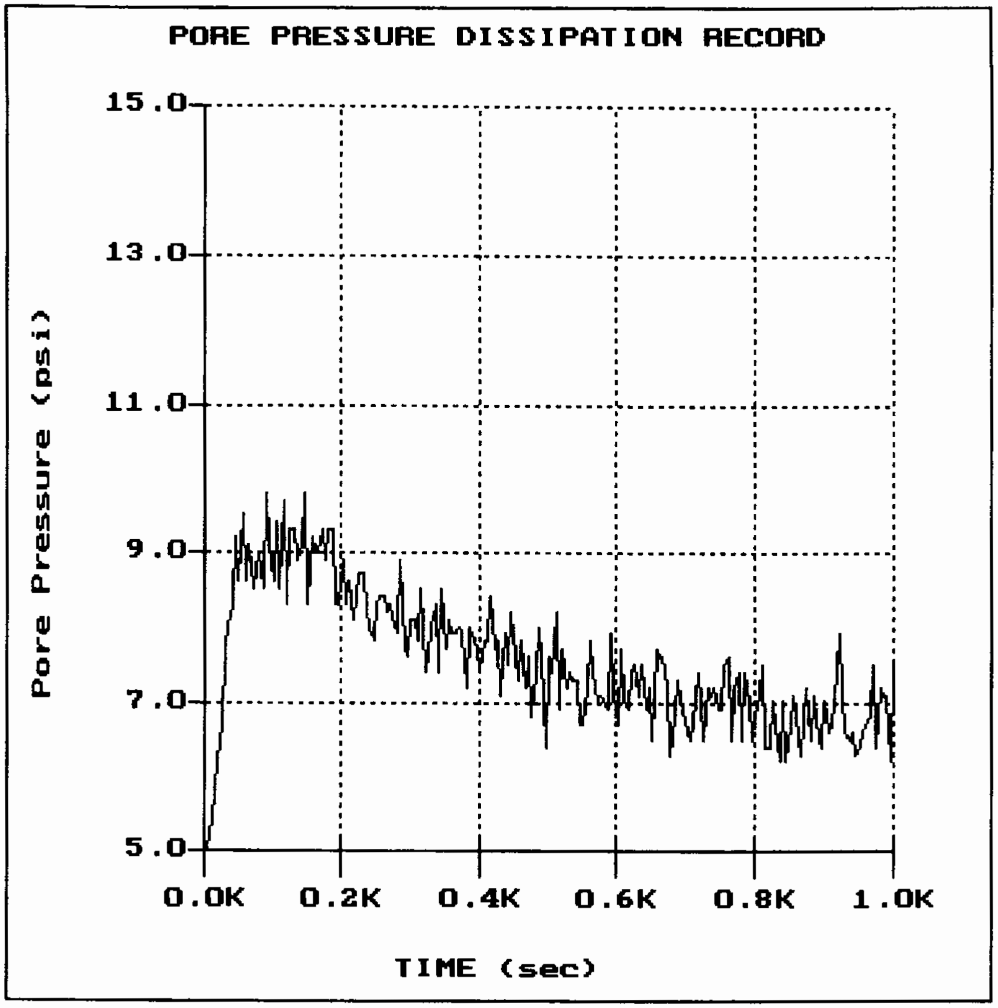


LFR LEVINE FRICKE

Hole:586-CP-02
Location:#586

Cone:20 TON AD071
Date:11:05:98 17:05

File: 108C19.PPR
Depth (m): 20.05
(ft): 65.78
Duration : 1000.0s

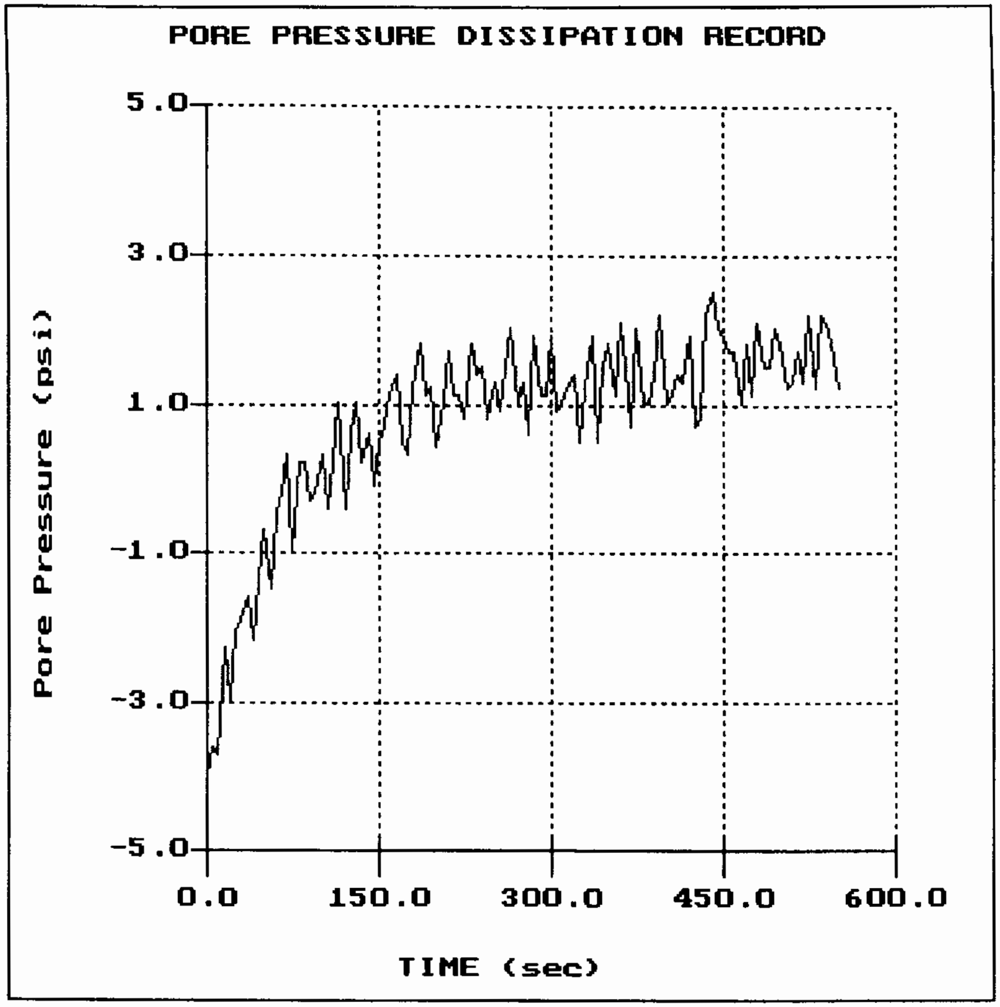


LFR LEVINE FRICKE

Hole:586-CP-03
Location:#586

Cone:20 TON AD071
Date:11:05:98 19:28

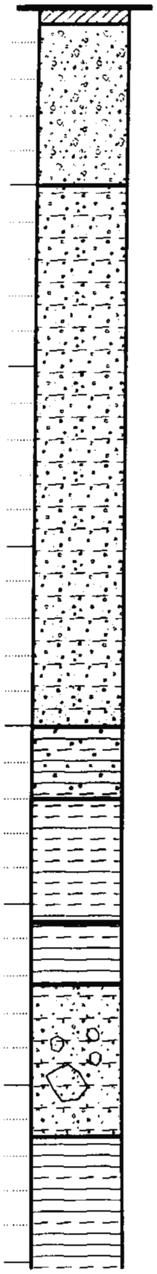
File: 108C20.PPR
Depth (m): 14.60
(ft): 47.90
Duration : 550.0s


PORE PRESSURE DISSIPATION RECORD

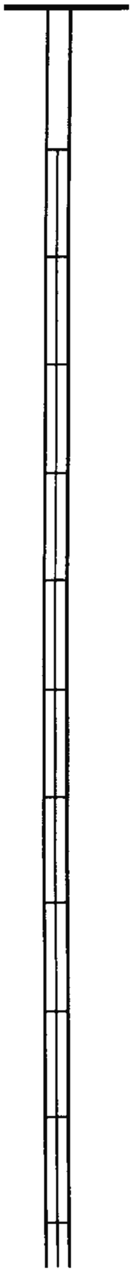
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT surface.
			GRAVEL Fill.
		0.0	
5			SILTY SANDY GRAVEL (GM), brownish gray, dry, angular to subangular, well graded.
		Poor recovery	
		0.0	
10			
15			
		0.0	
20			GRAVELLY SILTY CLAY (CL), grayish brown, slighlty moist, very stiff, very low plasticity.
		0.0	
			CLAYEY SILT (ML), yellowish brown, moist, very stiff, very low plasticity, trace gravel.
25			
		0.0	SILTY CLAY (CL), yellowish brown, very moist, soft to medium stiff, low to medium plasticity, trace gravel.
			SILTY GRAVEL (GM), yellowish brown, very moist, dense, coarse, subangular.
		0.0	COBBLES, siltstone, dry.
30			
			SILTY CLAY (CL), grayish brown, veins of oxidized flecks, moist, medium stiff, low plasticity.
		Poor recovery	
35			

Graphic Log



Sample Interval



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 2, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

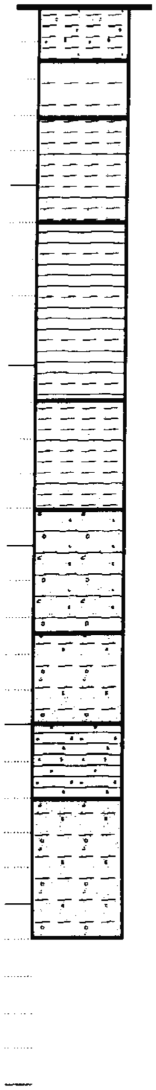
EXPLANATION

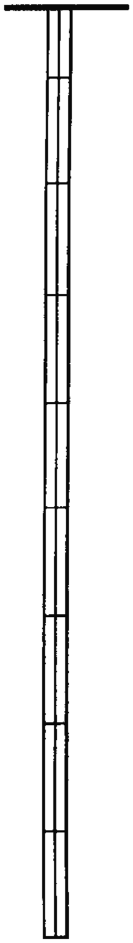
▤	Clay
┅	Silt
⛆	Sand
⁘	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			GRAVELLY SANDY SILT (ML), grayish brown, moist, soft, very low plasticity.	
			SILTY SAND (SM), dark yellowish brown, moist, dense, very fine grained, trace gravel.	
		0.0	CLAYEY SANDY SILT (ML), grayish brown mottled yellowish brown, very moist, stiff, very low plasticity.	
40				40
		0.0	SILTY CLAY (CL), grayish brown mottled olive-gray, moist, very stiff, low plasticity, trace sand, oxidized.	
		0.0		
45				45
		0.0	CLAYEY SANDY SILT (ML), olive-gray, moist, very stiff, low plasticity, very fine sand.	
			GRAVELLY CLAYEY SAND (SC), olive-brown, moist, hard, poorly graded, very fine with gravel to 3 centimeters.	
50				50
		0.0		
		0.0	SILTY GRAVELLY SAND (SM), olive-brown, moist, loose, well graded, rounded, fine grained.	
55				55
			GRAVELLY CLAY (CL), yellowish brown, moist, medium stiff, medium plasticity.	
		0.0		
			SILTY GRAVELLY SAND (SM), olive-gray, slightly moist, hard, well graded, weathered, stained.	
60				60
			BOTTOM OF BORING AT 61 FEET.	
65				65
70				70

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 2, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

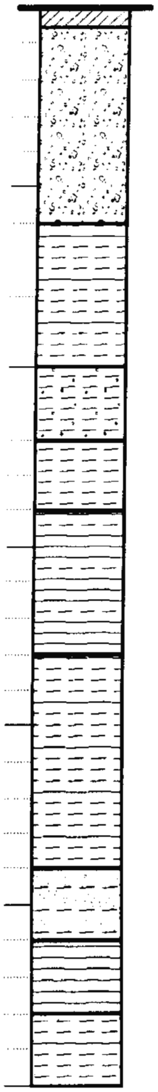
▤	Clay
┅	Silt
░	Sand
⁘	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval



ASPHALT surface.

GRAVEL Fill.

CLAYEY SILT (ML), yellowish brown, slightly moist, stiff, low plasticity, trace sand.

GRAVELLY SILT (ML), yellowish brown, slightly moist, very stiff, low plasticity.

SILT (ML), yellowish brown, moist, medium stiff, low plasticity, oxidized.

SILTY CLAY (CL), yellowish brown, very moist, soft, low plasticity.

CLAYEY SILT (ML), yellowish brown, moist, medium stiff, low plasticity.

SILTY SAND (SM), yellowish brown, very moist, dense, fine grained.

SANDY CLAY (CL), yellowish brown, moist, medium stiff, low plasticity, trace gravel.

CLAYEY SANDY SILT (ML), yellowish brown, moist, soft.

BOTTOM OF BORING AT 30 FEET.

JENNIFER J. BEATTY
No. 6650
Exp. 4/3/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 2, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

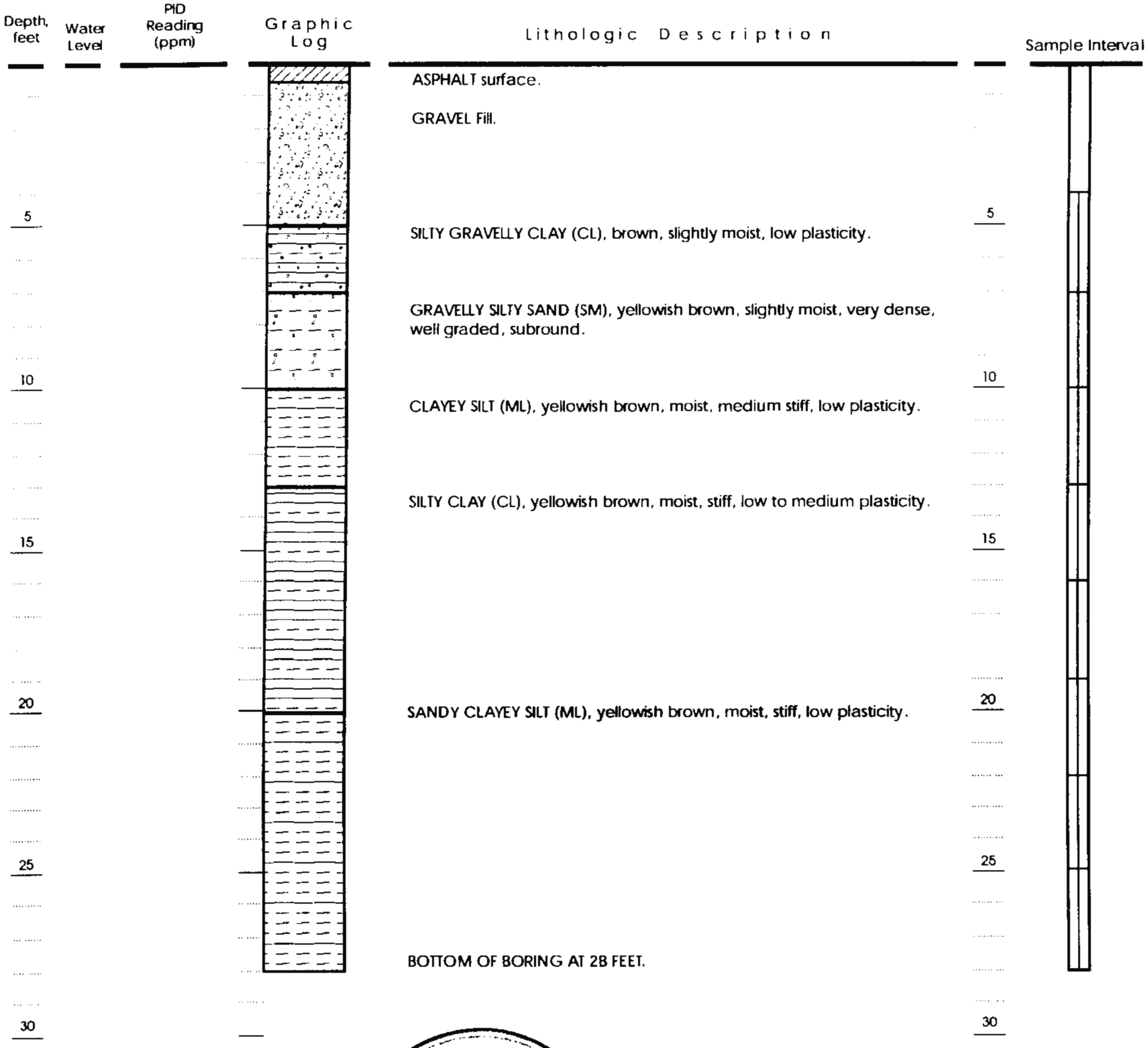
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT surface.

GRAVEL Fill.

SILTY GRAVELLY CLAY (CL), brown, slightly moist, low plasticity.

GRAVELLY SILTY SAND (SM), yellowish brown, slightly moist, very dense, well graded, subround.

CLAYEY SILT (ML), yellowish brown, moist, medium stiff, low plasticity.

SILTY CLAY (CL), yellowish brown, moist, stiff, low to medium plasticity.

SANDY CLAYEY SILT (ML), yellowish brown, moist, stiff, low plasticity.

BOTTOM OF BORING AT 28 FEET.

No. 6650
Exp. 4/30/01

EXPLANATION

- ☰ Clay
- ☷ Silt
- ▒ Sand
- ⁘ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 2, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

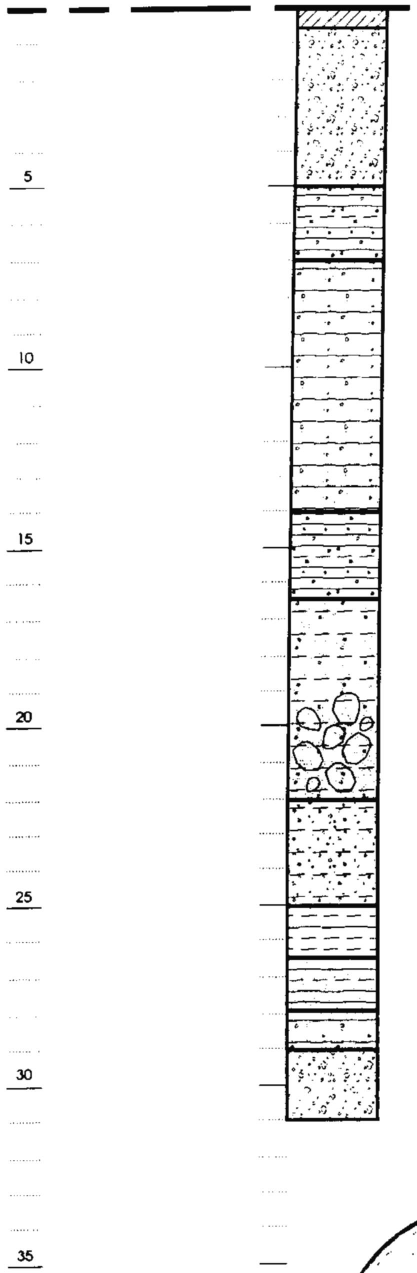
LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT surface.

GRAVEL Fill.

GRAVELLY SILTY CLAY (CL), brown, moist, stiff, low plasticity.

GRAVELLY CLAYEY SILT (ML), yellowish brown, very moist, very stiff, low plasticity.

GRAVELLY SILTY CLAY (CL), yellowish brown, moist, very stiff, low plasticity.

SILTY GRAVELLY SAND (SM), brown, moist, dense, well graded, subround to 1. 5 centimeters.

COBBLES (GP), gray, dry, hard.

SILTY GRAVEL (GM), brownish gray, dry, very dense, well graded, 1 centimeter, possibly cobble size.

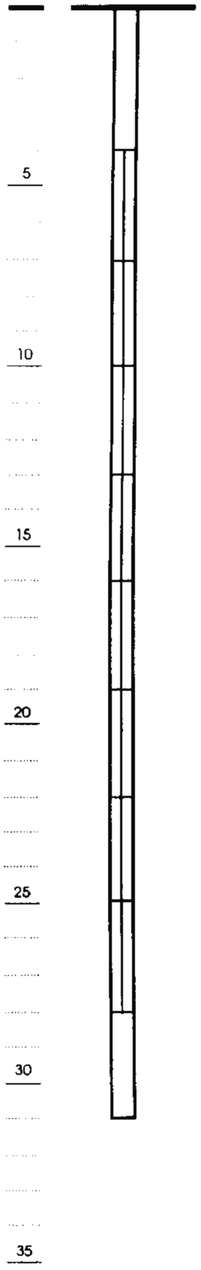
SANDY CLAYEY SILT (ML), yellowish brown, moist, medium stiff, low plasticity.

SILTY SANDY CLAY (CL), yellowish brown, moist, soft, medium plasticity.

CLAYEY SAND (SC), yellowish brown, very moist, dense, medium grained, trace gravel.

SANDY GRAVEL (GW), olive-gray, dry, hard, angular, well graded, highly weathered.

BOTTOM OF BORING AT 31 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 3, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

- ☰ Clay
- ☰ Silt
- ░ Sand
- ░ Gravel

PID - Photoionization Detector

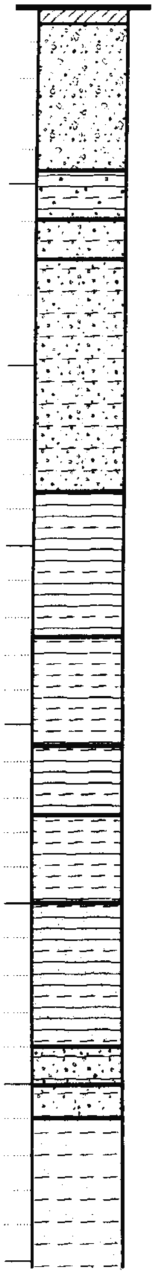
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT surface.	
			Base rock.	
5			GRAVELLY SILTY CLAY (CL), brown, slightly moist, stiff, low plasticity.	
		Poor recovery	SILTY GRAVEL (GM), brown, slightly moist, very dense.	
			SILTY SANDY GRAVEL (GM), dark gray, very dense, well graded, subround to angular to more than 5 centimeters, 15% silt.	
10				
		0.0		
			SILTY CLAY (CL), yellowish brown, moist, soft, medium plasticity, trace coarse sand.	
15		0.0		
		0.1		
			CLAYEY SILT (ML), yellowish brown, moist, medium stiff, low plasticity, occasional rounded coarse sand.	
20		0.0		
			SILTY CLAY (CL), yellowish brown, slightly moist, stiff, medium to high plasticity, trace fine sand, occasional subround coarse grains.	
		0.0		
			SANDY CLAYEY SILT (ML), yellowish brown, moist, very stiff, friable, 10% sand, very fine grained with common subangular coarse grains.	
25		0.0		
			SILTY SANDY CLAY (CL), as above, medium stiff, low plasticity, 25% sand, fine to medium grained.	
		0.0		
30			CLAYEY SANDY GRAVEL (GC), grayish brown, very moist, medium dense, well graded. SILTY GRAVEL (GM), dark grayish brown, hard, semi consolidated, cemented, angular decomposed fragments. SILTY SAND (SM) at 31 feet, yellowish brown, moist, medium dense, 15% silt, poorly graded - fine grained with trace coarse sand and gravel, subround.	
			Clayey with depth.	
35				

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 3, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

J. BEATTY
No. 6650
Exp. 4/3/01

EXPLANATION

▤	Clay
☰	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

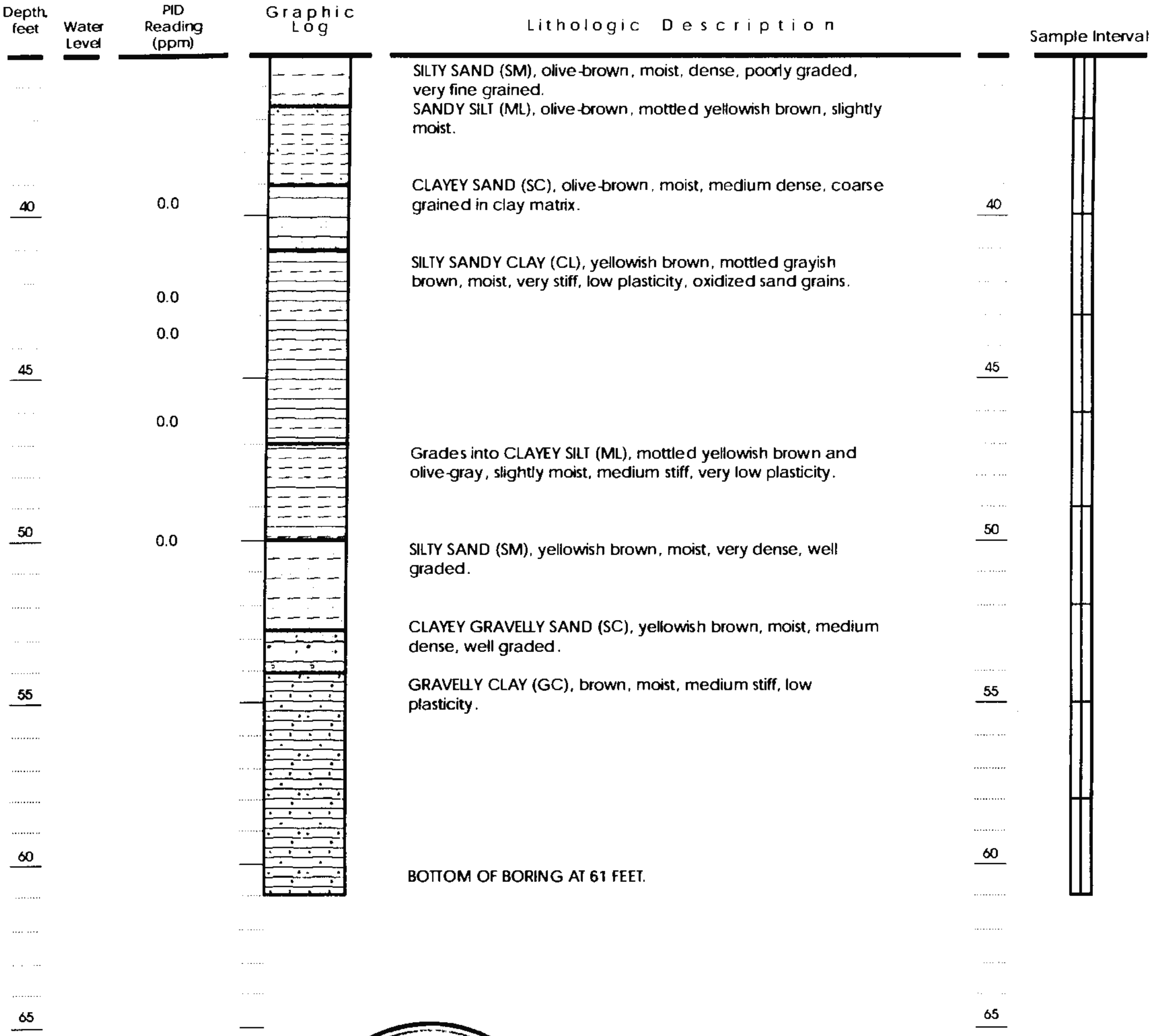
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-05 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



SILTY SAND (SM), olive-brown, moist, dense, poorly graded, very fine grained.

SANDY SILT (ML), olive-brown, mottled yellowish brown, slightly moist.

CLAYEY SAND (SC), olive-brown, moist, medium dense, coarse grained in clay matrix.

SILTY SANDY CLAY (CL), yellowish brown, mottled grayish brown, moist, very stiff, low plasticity, oxidized sand grains.

Grades into CLAYEY SILT (ML), mottled yellowish brown and olive-gray, slightly moist, medium stiff, very low plasticity.

SILTY SAND (SM), yellowish brown, moist, very dense, well graded.

CLAYEY GRAVELLY SAND (SC), yellowish brown, moist, medium dense, well graded.

GRAVELLY CLAY (GC), brown, moist, medium stiff, low plasticity.

BOTTOM OF BORING AT 61 FEET.

JENNIFER J. BEATTY
No. 6650
Exp. 4/3?/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 3, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

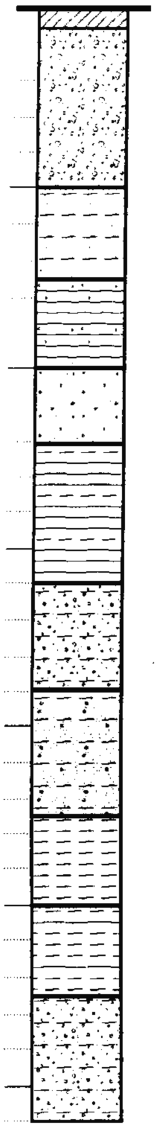
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-05 *(page 2 of 2)*

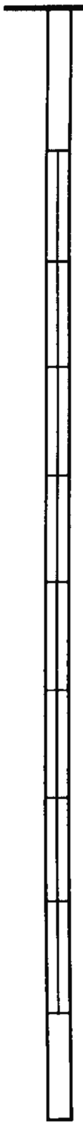
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT surface.
			GRAVEL Fill.
5			
		0.0	SILTY SAND (SM), dark grayish brown, very moist, loose, well graded, subround, some gravel.
		0.0	GRAVELLY SANDY CLAY (CL), brown, moist, medium stiff, very low plasticity.
10			GRAVELLY SAND (SP), olive-brown, moist, very loose, fine grained with 15% gravel, subround to 3 centimeters.
		0.0	
			SILTY CLAY (CL), yellowish brown, moist, soft, low to medium plasticity.
		0.0	SILTY CLAY (CL), yellowish brown, very moist, very stiff, low plasticity.
15			
			SILTY SANDY GRAVEL (GM), yellowish to grayish brown, slightly moist, very dense, well graded, subangular.
		0.0	
			SILTY GRAVELLY SAND (SM), brownish gray, dry, hard, well graded.
20		0.0	
			SILT (ML), yellowish brown, moist, medium stiff, very low plasticity.
25			SANDY CLAYEY SILT (ML), yellowish brown, moist, medium stiff, very low plasticity.
			SILTY SANDY GRAVEL (GM), yellowish brown, moist, very dense, gap graded, rounded to 3 centimeters.
30			
			BOTTOM OF BORING AT 31 FEET.
35			

Sample Interval



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 3, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
▨	Sand
▩	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

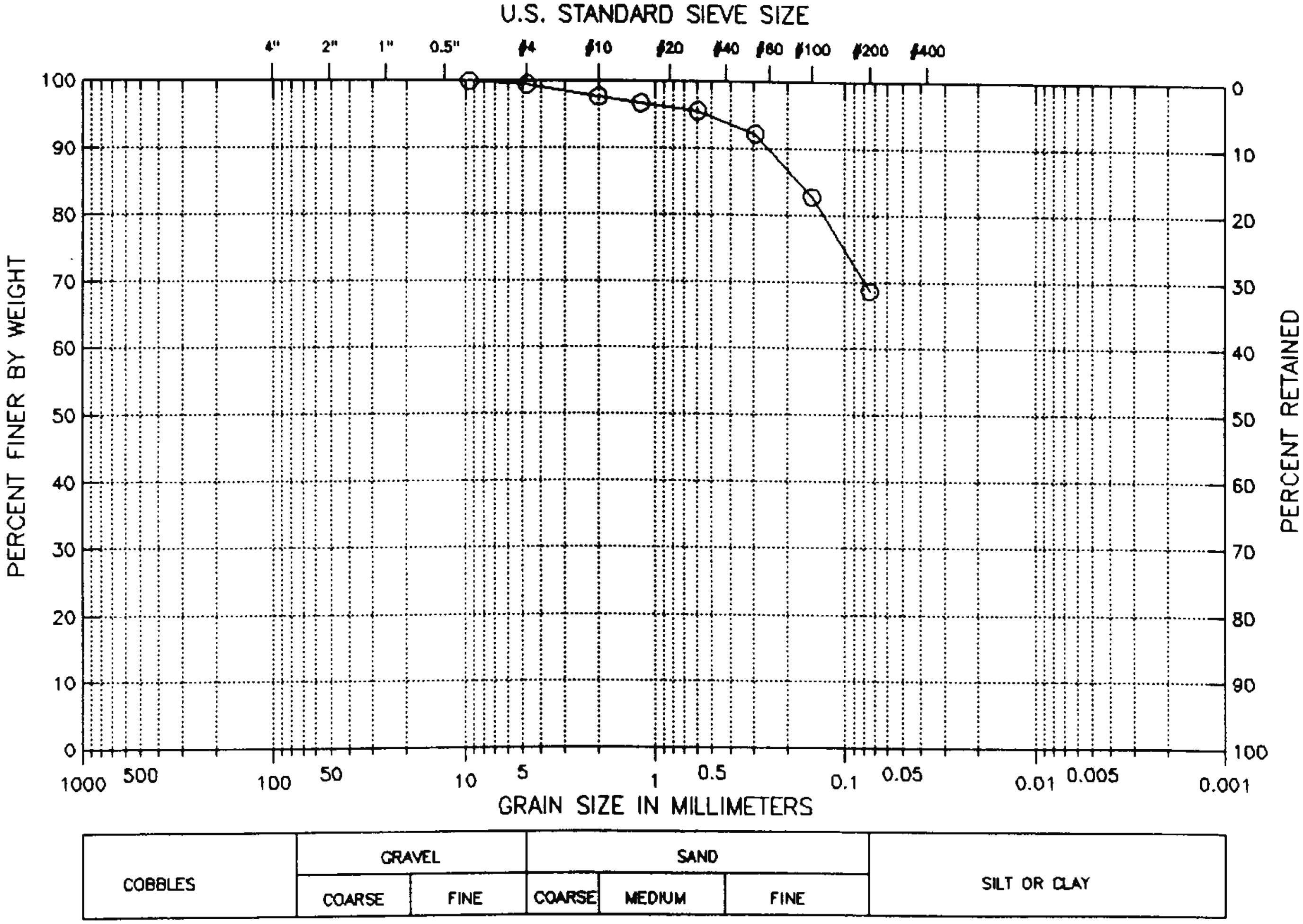
LFR
LEVINE•FRICKE

LITHOLOGY FOR 586-BH-06 *(page 1 of 1)*

Project No. 6730.00-024

Boring No. : 586-BH-02
Sample No.: 23.0-23.5 SP
Tested by : C. WASON
Filename : 586-23

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
BROWN SANDY CLAY

Remarks :
Depth: 23.0-23.5 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 16 10:58:44 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 586-23
Project No. : 16148A
Depth : 23.0-23.5 FT.
Elevation : NA
Boring No. : 586-BH-02
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 23.0-23.5 SP
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SANDY CLAY
Remarks : Depth: 23.0-23.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	0.81	0.81	100
#10	0.079	2.00	3.15	3.96	98
#16	0.047	1.19	1.64	5.60	97
#30	0.023	0.60	1.97	7.57	96
#50	0.012	0.30	5.77	13.34	92
#100	0.006	0.15	16.59	29.93	83
#200	0.003	0.07	24.51	54.44	69

Total Dry Weight of Sample = 174.01

D85 : 0.1744 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 586-23
Project No. : 16148A
Depth : 23.0-23.5 FT.
Elevation : NA
Boring No. : 586-BH-02
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 23.0-23.5 SP
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SANDY CLAY
Remarks : Depth: 23.0-23.5 feet

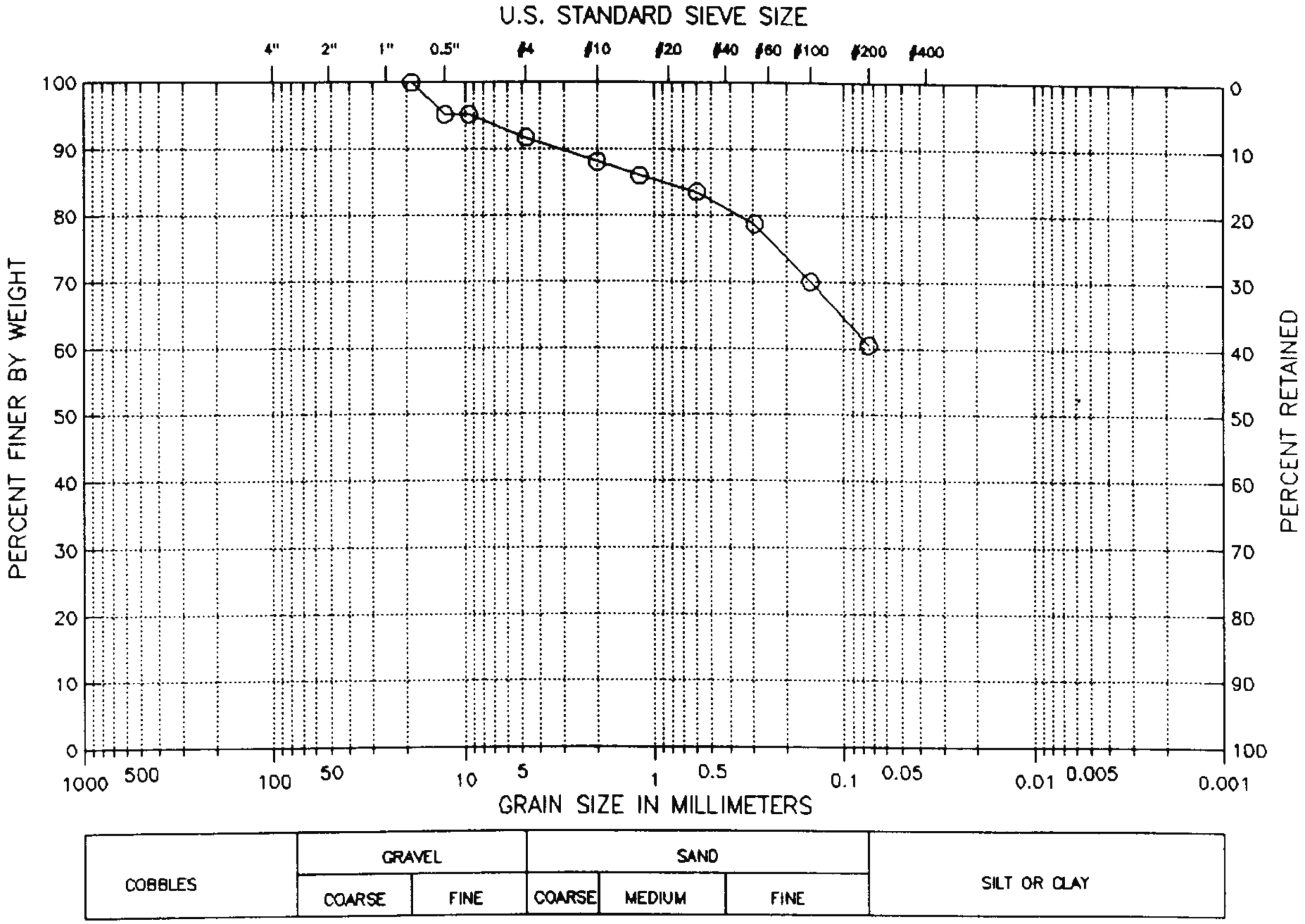
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	586-23	184.89	393.30	358.90	19.77

Average Moisture Content = 19.77

Boring No. : 586–BH–04
Sample No.: 10.5–11.0 SV
Tested by : C. WASON
Filename : 586–10

Project : LEVINE FRICKE RECON 6730.00–024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
BROWN SANDY CLAY WITH FINE GRAVEL

Remarks :
Depth: 10.5–11.0 feet

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 586-10
Project No. : 16148A
Depth : 10.5-11.0 FT.
Elevation : NA
Boring No. : 586-BH-04
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 10.5-11.0 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SANDY CLAY WITH FINE GRAVEL
Remarks : Depth: 10.5-11.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	7.82	7.82	95
0.375"	0.374	9.51	0.00	7.82	95
#4	0.187	4.75	5.75	13.57	92
#10	0.079	2.00	6.02	19.59	88
#16	0.047	1.19	3.40	22.99	86
#30	0.023	0.60	4.07	27.06	84
#50	0.012	0.30	8.05	35.11	79
#100	0.006	0.15	14.39	49.50	70
#200	0.003	0.07	15.70	65.20	61

Total Dry Weight of Sample = 165.37

D85 : 0.8735 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 586-10
Project No. : 16148A
Depth : 10.5-11.0 FT.
Elevation : NA
Boring No. : 586-BH-04
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 10.5-11.0 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SANDY CLAY WITH FINE GRAVEL
Remarks : Depth: 10.5-11.0 feet

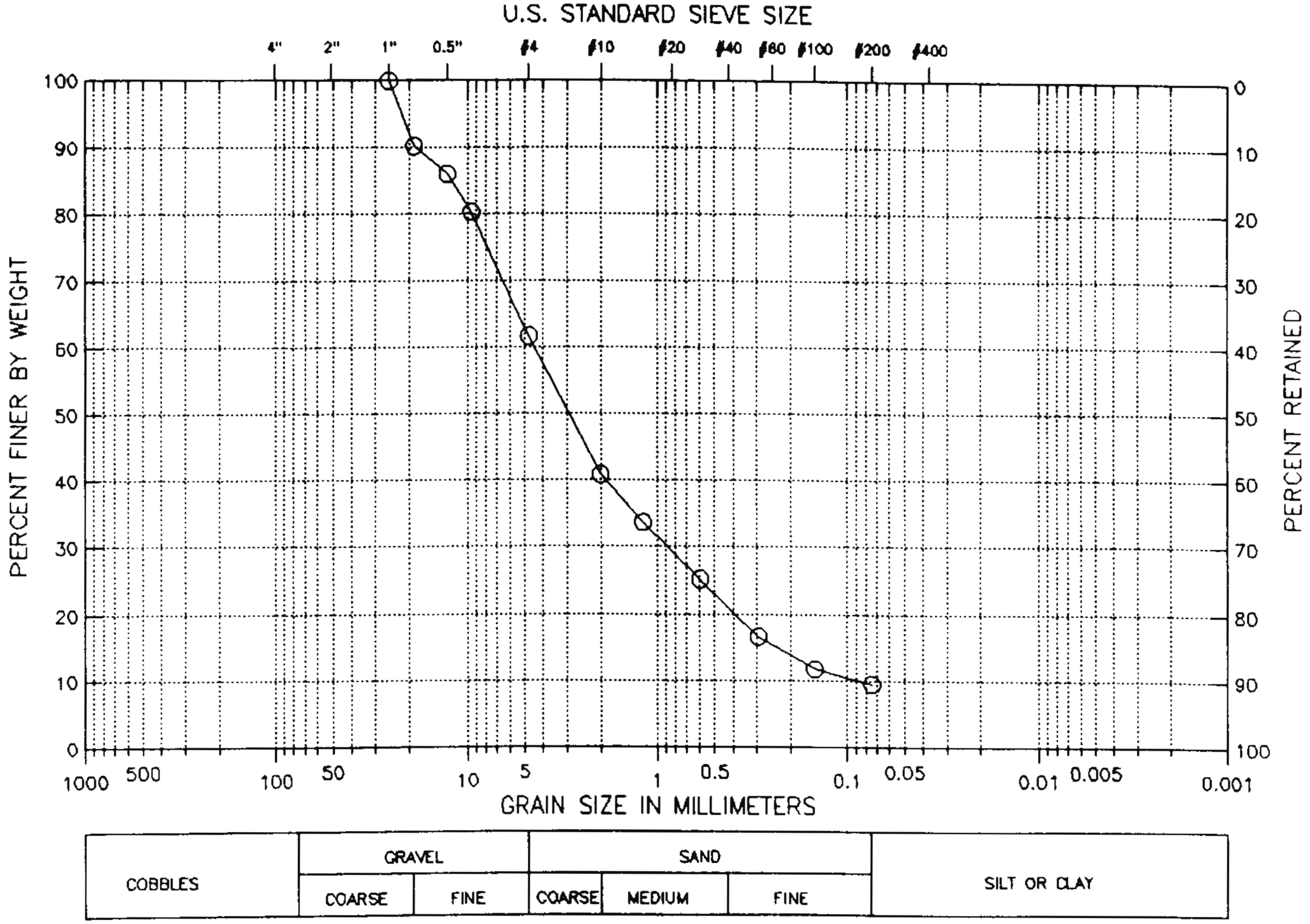
Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 586-10	188.28	384.80	353.65	18.84

Average Moisture Content = 18.84

Boring No. : 586-BH-06
Sample No.: 22.0-22.5 SV
Tested by : C. WASON
Filename : 586-22

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :
(SW-SM) Well-graded sand with silt and gravel

Visual Description :
BROWN GRAVELLY SAND

Remarks :
Depth: 22.0-22.5 FEET

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 586-22
Project No. : 16148A	Depth : 22.0-22.5 FT.	Elevation : NA
Boring No. : 586-BH-06	Test Date : 12/16/98	Tested by : C. WASON
Sample No. : 22.0-22.5 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN GRAVELLY SAND

Remarks : Depth: 22.0-22.5 FEET

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
1"	1.012	25.70	0.00	0.00	100
0.75"	0.748	19.00	18.37	18.37	90
0.5"	0.500	12.70	7.92	26.29	86
0.375"	0.374	9.51	10.92	37.21	80
#4	0.187	4.75	35.25	72.46	62
#10	0.079	2.00	39.63	112.09	41
#16	0.047	1.19	13.48	125.57	34
#30	0.023	0.60	15.85	141.42	25
#50	0.012	0.30	16.18	157.60	17
#100	0.006	0.15	9.26	166.86	12
#200	0.003	0.07	4.26	171.12	10

Total Dry Weight of Sample = 189.14

D85 : 12.0189 mm
D60 : 4.4299 mm
D50 : 2.9316 mm
D30 : 0.8828 mm
D15 : 0.2335 mm
D10 : 0.0857 mm

Soil Classification

ASTM Group Symbol : SW-SM
ASTM Group Name : Well-graded sand with silt and gravel
AASHTO Group Symbol : A-1-a(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 586-22
Project No. : 16148A
Depth : 22.0-22.5 FT.
Elevation : NA
Boring No. : 586-BH-06
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 22.0-22.5 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN GRAVELLY SAND
Remarks : Depth: 22.0-22.5 FEET

Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	586-22	184.78	383.50	373.92	5.07

Average Moisture Content = 5.07

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 592

ARCO #2074
1405 Branham Lane
San Jose, California 95118

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silty/clayey gravel or gravelly silt to approximately 20 to 25 feet below the ground surface (bgs) underlain by clays to approximately 43 feet bgs. The CPT logs indicate coarser grained material (sands) from 25 to 43 feet bgs than encountered during drilling. The shallowest depth to groundwater measured was approximately 30 feet bgs.

SYSTEM DESCRIPTION

Records provided by Arco indicate that the UST system at the site consists of three 12,000-gallon double-walled USTs constructed of fiberglass, with single-walled fiberglass piping in a hytral liner. The Form B permit application, dated 2/92 indicates double-walled fiberglass piping, but this is apparently incorrect. The UST system utilizes mechanical line leak detection for piping leak detection and continuous interstitial monitoring for UST leak detection.

RESULTS

MtBE was detected in soil-gas, soil, and groundwater samples collected from the site. MtBE was detected in 7 of the 25 soil-gas samples at concentrations ranging from 6.1 μg/l to 580 μg/l, 5 of 12 soil samples at concentrations ranging from 6.1 μg/kg to 110 μg/kg, and 4 of the 5 groundwater samples at concentrations ranging from 6 μg/l to 40 μg/l. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 22 of the 25 soil-gas samples at concentrations ranging from 1.1 μg/l (meta/para-xylene) to 37 μg/l (toluene). TPH as gasoline was detected in 8 of the 25 soil-gas samples at concentrations ranging from 100 μg/l to 12,000 μg/l. Toluene was detected in one soil sample (5.4 μg/kg) and xylene was detected in three soil samples (up to 9.5 μg/kg). Petroleum constituents were not detected in groundwater samples collected at this site..

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	On list due to waste oil release. Case closed 11/95.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Unknown
System operational?	Not at time of inspection
Overfill containment (gallons):	Not in place at time of inspection
Drop tube equipped with striker plate?	Unknown
Under island containment present?	Yes
Under island containment monitoring:	Float switch
Quick release dispenser hoses?	Yes
Alarm system functional?	Not at time of inspection
Type:	
Vents:	
Vent type:	Not in place at time of inspection
Vent piping:	Not noted
Condition of UST turbine sump:	Fair
Condition of UST flex line sump:	Not noted
Vapor recovery system:	Balanced
Years of operation since upgrade:	Since early to mid- 1990
Years of operation as fueling facility:	Approximately 31 years
Estimated throughput:	Greater than 300,000 gallons per month
Monitoring systems operational?	Not operating at time of inspection
Systems operations, comment:	Not operating at time of inspection
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Not noted
Piping leak detection:	Not noted
Is system monitored?	Not noted
Station inventory records available?	Not noted
Records up to date?	Not noted
Records complete?	Not noted
Supplier log reviewed?	Not noted
Spill log reviewed?	Not noted
Spill log comments:	Not noted
Personnel training:	Not noted

Comments:

System was temporarily closed for construction at time of inspection. The piping, which was partially in a lined trench and improperly sloped, was being replaced. SJFD and SCVWD inspectors were on-site at time of inspection.

SITE INSPECTION

Condition of apron around pumps:	Fair
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	There are quite a few low spots and ashpalt is cracked. Site is generally uneven and lowest spot observed is the storm drain west of the western pump island.
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Possibly through cracks and in low spots. This should be checked out during next visit.
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Auto repair shop and former waste oil in the back (northern side) of the building.
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Well boxes may be vapor wells installed in the mid 80's as part of compliance. Wells near tanks may be in backfill and backfill appears to extend beyond concrete apron.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1-UNL-R

Date installed:	12/84
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground

Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2-UNL-R

Date installed:	12/84
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3-UNL-P

Date installed:	12/84
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground

Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #592
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
592-SG-01	03/23/99	8	6.1	<100	<1	5.2	<1	5.3	1.8	
		13	6.3	<100	<1	4.7	2.8	2.9	1.2	
		23	580	6200	<10	37	<10	24	<10	
592-SG-01-SPL		23	340	NA	<2.3	<2.7	<3.1	<3.1	<3.1	(a)
592-SG-02	03/23/99	8	<5	<100	<1	2.9	<1	1.2	<1	
592-SG-02-DUP		8	<5	<100	<1	4	2.7	1.7	2.2	
592-SG-02		13	<5	<100	<1	2	<1	5.2	1.9	
		23	85	250	<1	3	<1	1.5	<1	
592-SG-03	03/23/99	8	<5	<100	<1	4.1	<1	2.5	<1	
		13	<5	<100	<1	<1	<1	<1	<1	
		23	<5	<100	<1	<1	<1	1.4	<1	
592-SG-04	03/24/99	8	<5	100	<1	3	2.8	4.1	3.6	
		13	<5	<100	<1	3.3	4.3	6.5	2.8	
		23	280	12000	24	17	<1	28	8.7	
592-SG-05	03/24/99	8	<5	140	<1	3.4	<1	9.9	<1	
		17	<5	<100	<1	1.5	<1	1.3	<1	
		23	<5	<100	<1	3.2	<1	1.6	<1	
592-SG-06	03/24/99	8	<5	<100	<1	4.2	2	3.2	2.6	
		13	280	1200	<1	6.5	4.5	19	<1	
592-SG-07	03/24/99	8	<5	<100	<1	2	<1	<1	<1	
		13	<5	<100	<1	<1	<1	2.2	<1	
		23	<5	2400	<1	<1	<1	5.5	<1	
592-SG-07-DUP		23	<5	2800	<1	<1	<1	6.1	<1	
592-SG-08	03/24/99	8	<5	<100	<1	1.2	<1	1.1	<1	
		13	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (770 ug/L) and Methanol (24 ug/L). The concentration for Ethanol exceeded the calibration range.

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

[illegible] = Estimated value

[illegible]J = Not detected at the estimated reporting limit shown

Table 2

Summary of Chemical Analysis Results for Soil Samples - Site #592

Santa Clara Valley Water District

	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
592-BH-01	03/26/99	10.5-11.0	<5	<1	<5	5.4	<5	9.5	<5	<20	<20	<20	<200
		20.5-21.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		27.5-28.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		33.5-34.0	6.1	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
592-BH-02	03/26/99	13.5-14.0	7.2	<1	<5	<5	<5	7.5	<5	<20	<20	<20	<200
		22.5-23.0	110	<1	<5	<5	<5	7.4	<5	<20	<20	<20	<200
		29.0-29.5	38	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		38.0-38.5	20	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
592-BH-03	03/29/99	12.5-13.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		24.0-24.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
592-BH-04	03/29/99	10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		26.0-26.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 592
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
592-BH-01	03/26/99	36.3-37.0	6	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
592-BH-02	03/26/99	30.0-43.0	19	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
592-BH-03	03/29/99	41.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
592-BH-04	03/29/99	41.0	37	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
592-BH-04-DUP		41.0	40	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

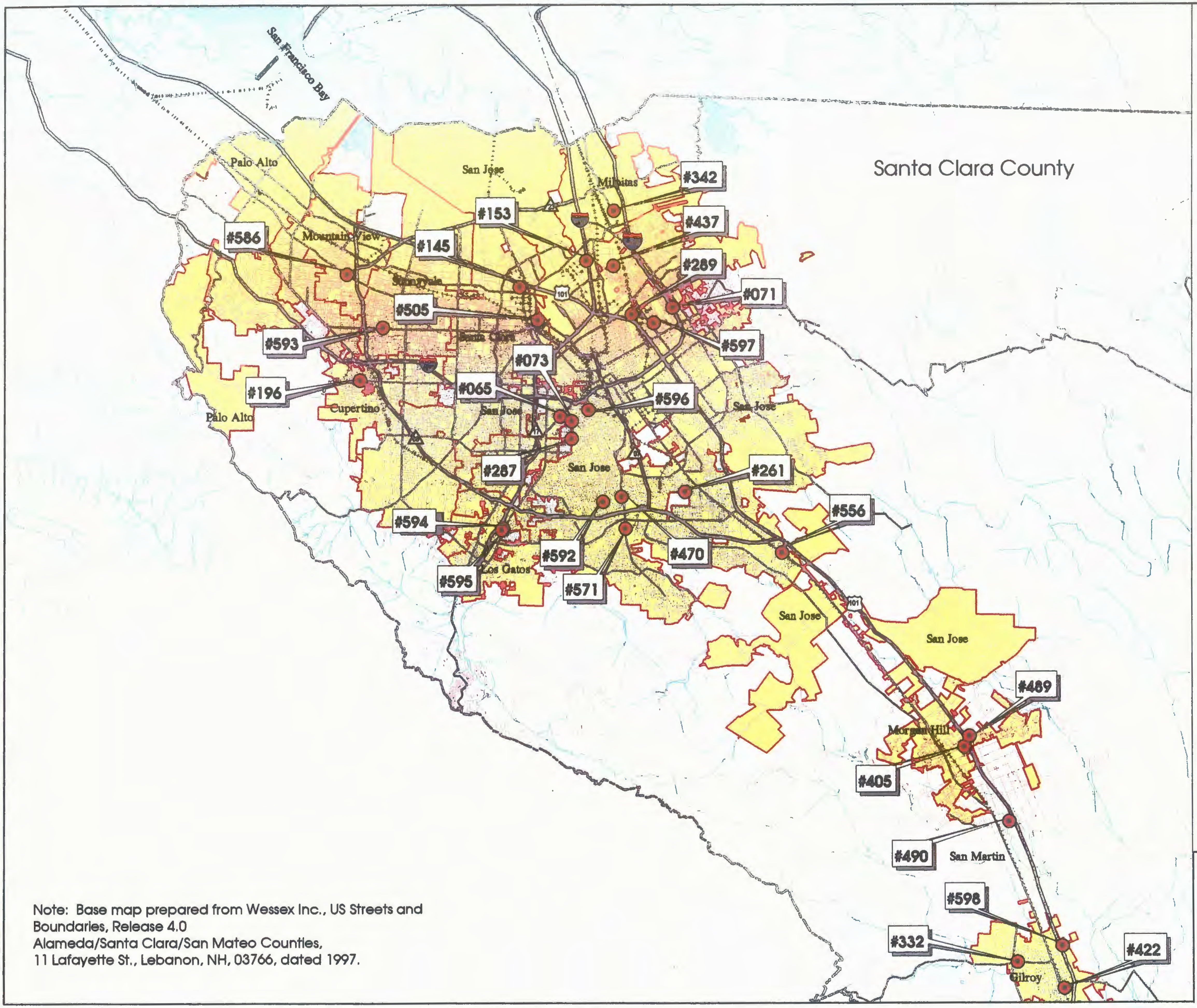
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

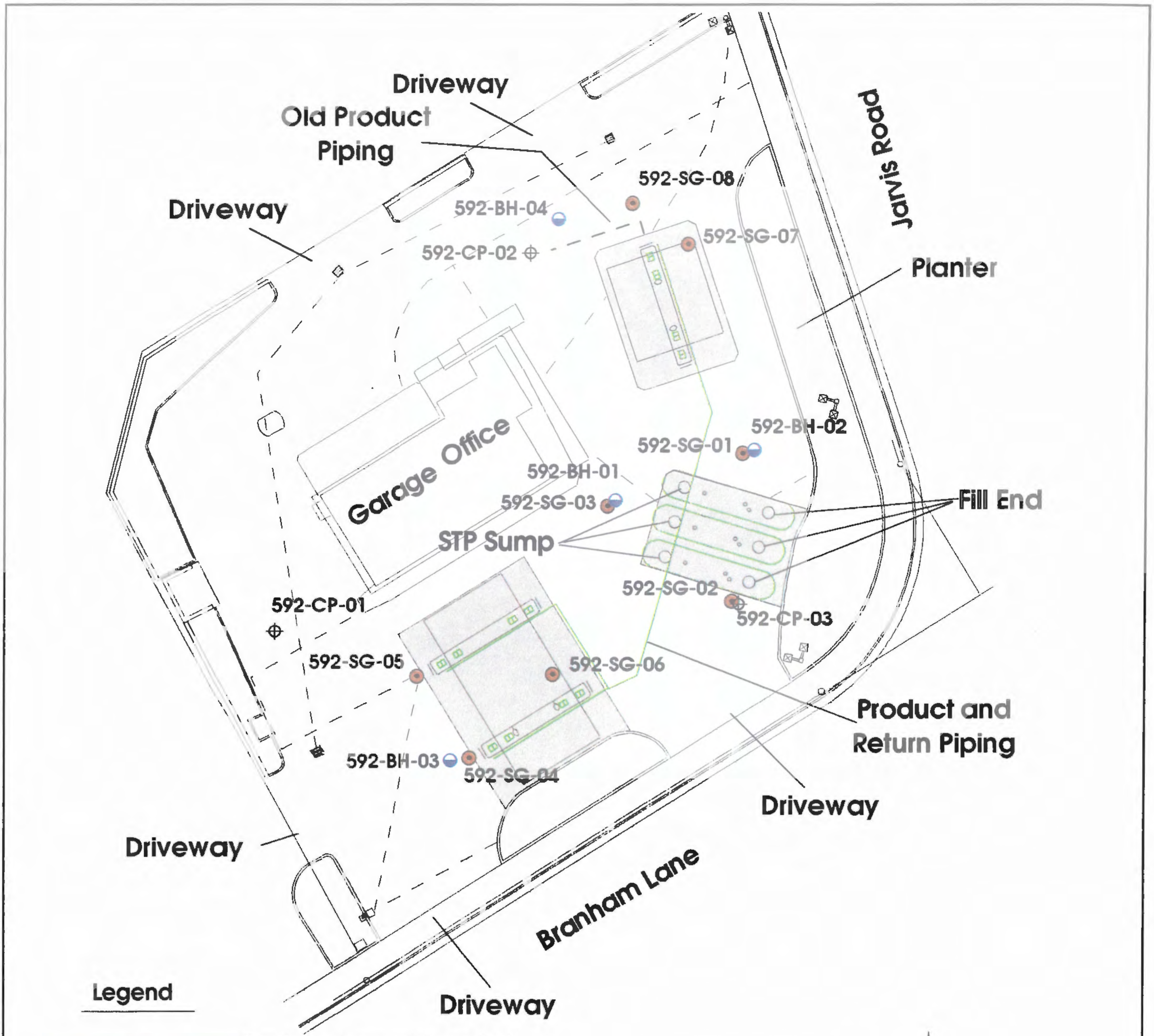
●	Site Location
🟨	City within Santa Clara County
	Santa Clara County Boundary
	Rivers, Creeks, and Streams
	Freeway
	Principal Arterials
	Local Streets and Roads
	Railroad Lines

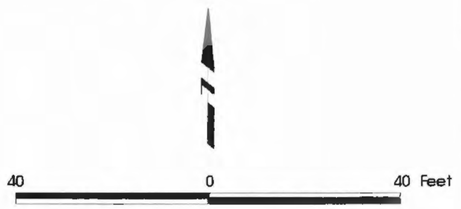
Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1





Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Location of piping is based on conversations with SCVWD and contractor, and is considered approximate.

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from As-Built Site Plan, Sheet AS-1, NWC Branham Lane and Jarvis Road, San Jose, CA, ARCO Prodcuts Company, by TAIT & Associates, 1001 Galaxy Way, Suite 404, Concord, CA, dated 10/4/96.

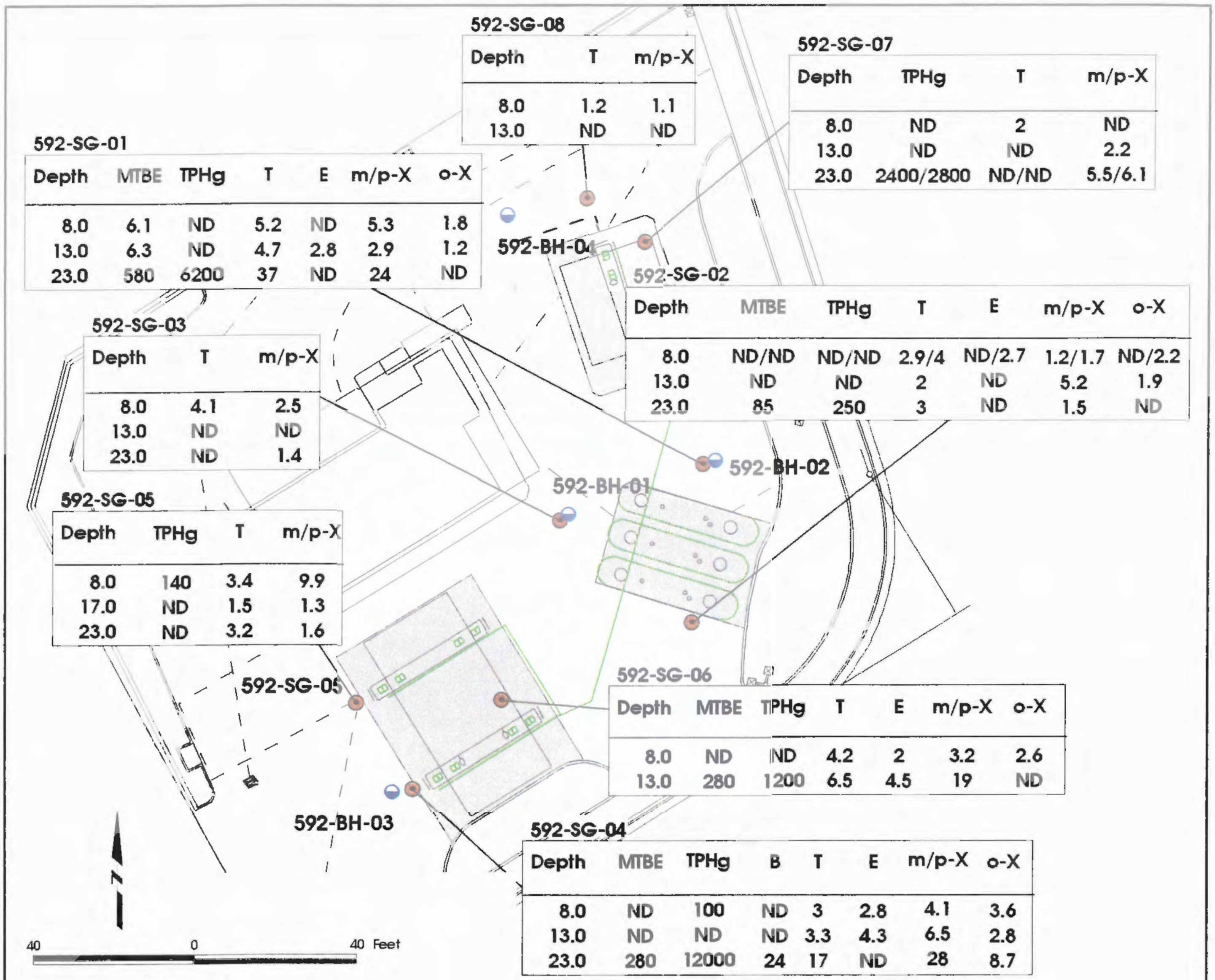
Site #592

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



592-SG-08

Depth	T	m/p-X
8.0	1.2	1.1
13.0	ND	ND

592-SG-07

Depth	TPHg	T	m/p-X
8.0	ND	2	ND
13.0	ND	ND	2.2
23.0	2400/2800	ND/ND	5.5/6.1

592-SG-01

Depth	MTBE	TPHg	T	E	m/p-X	o-X
8.0	6.1	ND	5.2	ND	5.3	1.8
13.0	6.3	ND	4.7	2.8	2.9	1.2
23.0	580	6200	37	ND	24	ND

592-SG-02

Depth	MTBE	TPHg	T	E	m/p-X	o-X
8.0	ND/ND	ND/ND	2.9/4	ND/2.7	1.2/1.7	ND/2.2
13.0	ND	ND	2	ND	5.2	1.9
23.0	85	250	3	ND	1.5	ND

592-SG-03

Depth	T	m/p-X
8.0	4.1	2.5
13.0	ND	ND
23.0	ND	1.4

592-SG-05

Depth	TPHg	T	m/p-X
8.0	140	3.4	9.9
17.0	ND	1.5	1.3
23.0	ND	3.2	1.6

592-SG-06

Depth	MTBE	TPHg	T	E	m/p-X	o-X
8.0	ND	ND	4.2	2	3.2	2.6
13.0	280	1200	6.5	4.5	19	ND

592-SG-04

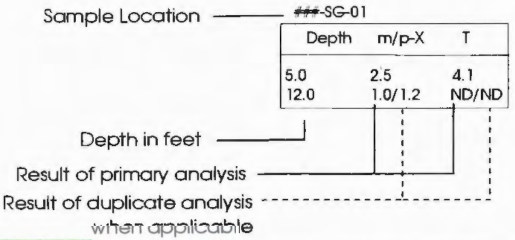
Depth	MTBE	TPHg	B	T	E	m/p-X	o-X
8.0	ND	100	ND	3	2.8	4.1	3.6
13.0	ND	ND	ND	3.3	4.3	6.5	2.8
23.0	280	12000	24	17	ND	28	8.7

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-SG-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

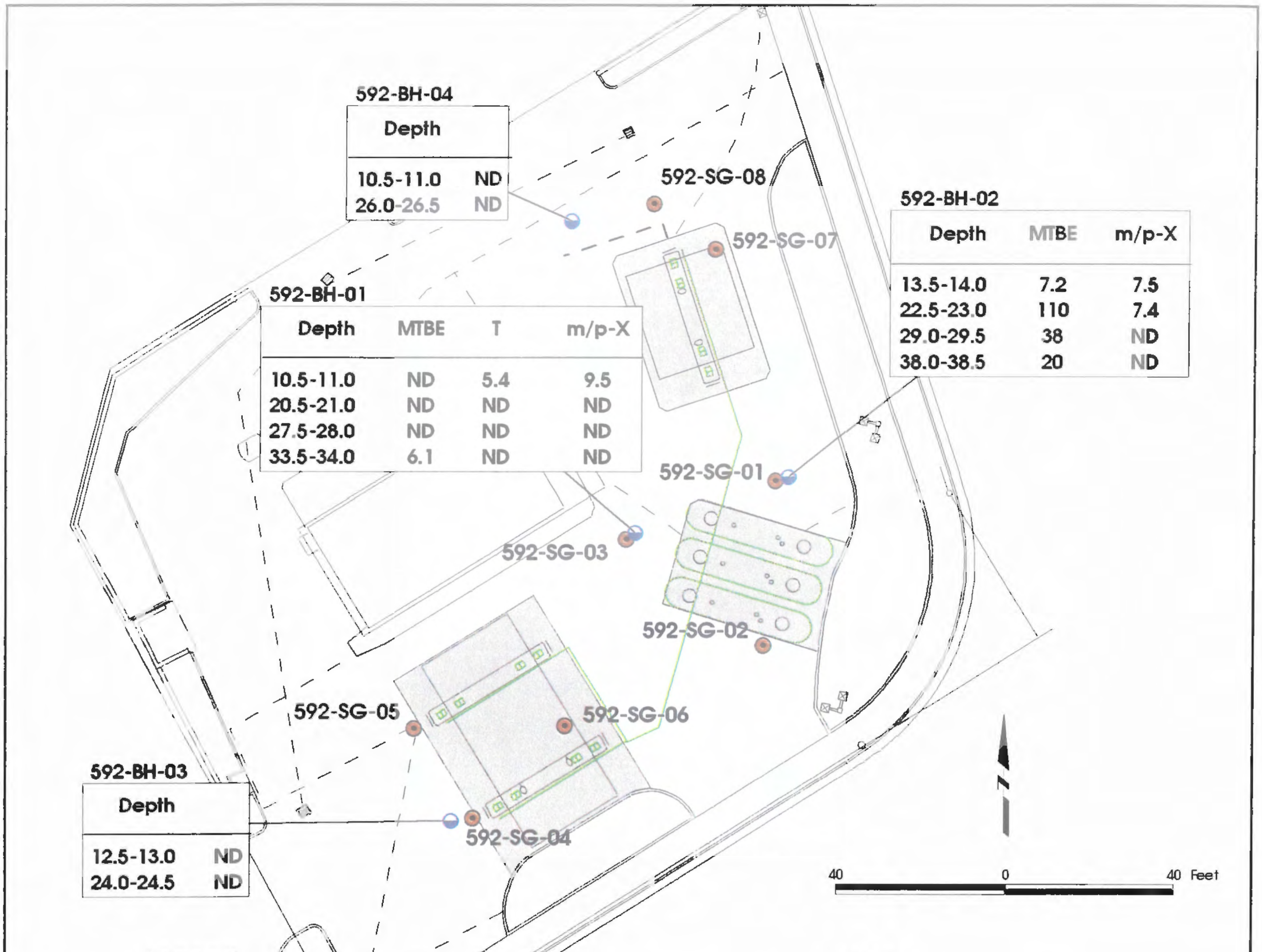
Site #592

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



592-BH-04

Depth	
10.5-11.0	ND
26.0-26.5	ND

592-BH-02

Depth	MTBE	m/p-X
13.5-14.0	7.2	7.5
22.5-23.0	110	7.4
29.0-29.5	38	ND
38.0-38.5	20	ND

592-BH-01

Depth	MTBE	T	m/p-X
10.5-11.0	ND	5.4	9.5
20.5-21.0	ND	ND	ND
27.5-28.0	ND	ND	ND
33.5-34.0	6.1	ND	ND

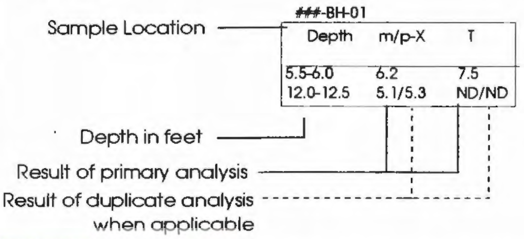
592-BH-03

Depth	
12.5-13.0	ND
24.0-24.5	ND

Legend

- ◒ Soil and groundwater sampling location
- ● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 —— ▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

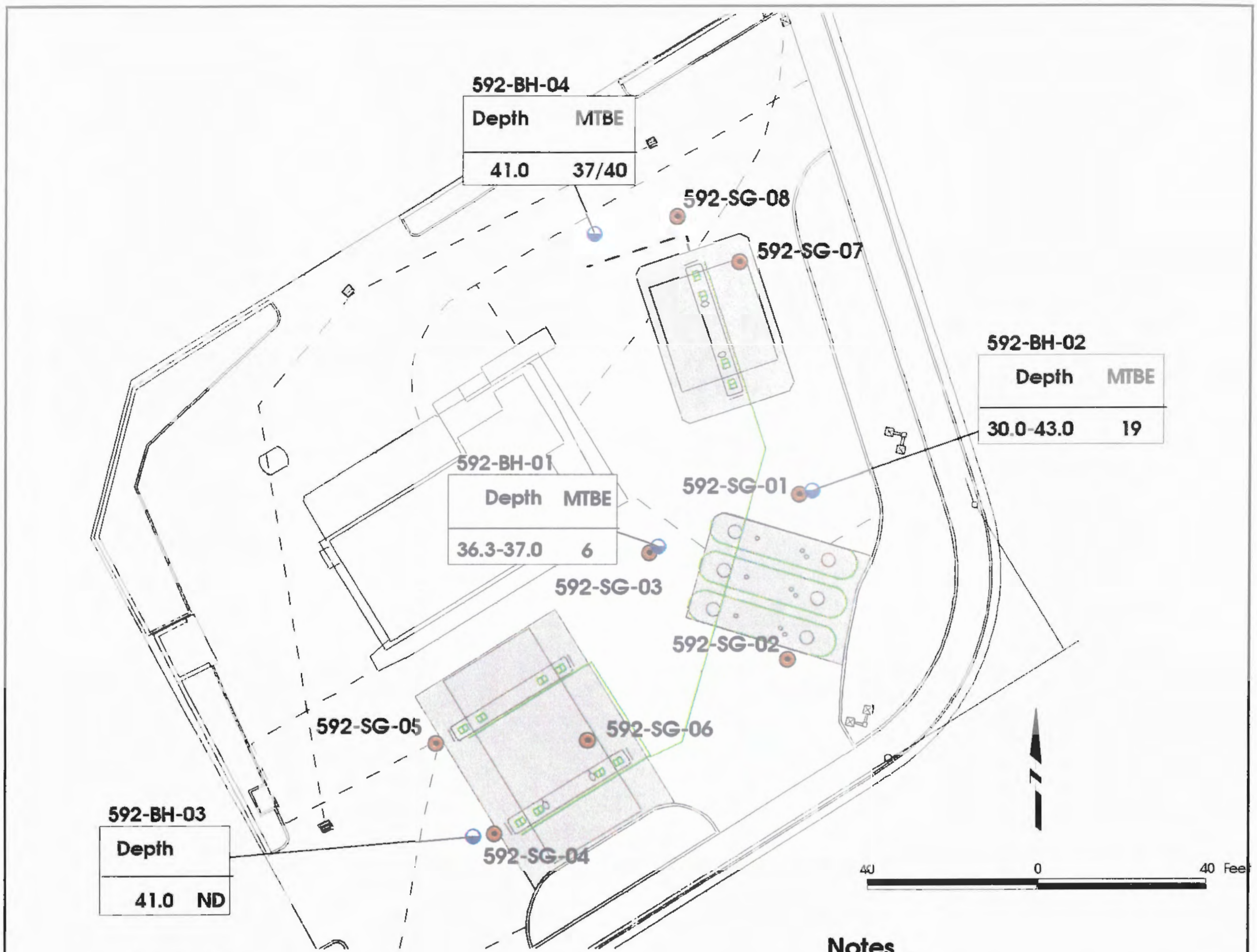
Site #592

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

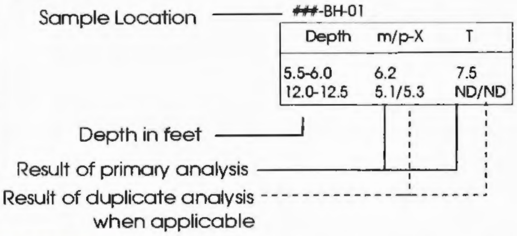
Figure 4



Legend

- ◒ Soil and groundwater sampling location
- ● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



- 🟩 Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- ☐ Concrete slab
- ▤ Storm Drain Catch Basin
- — — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

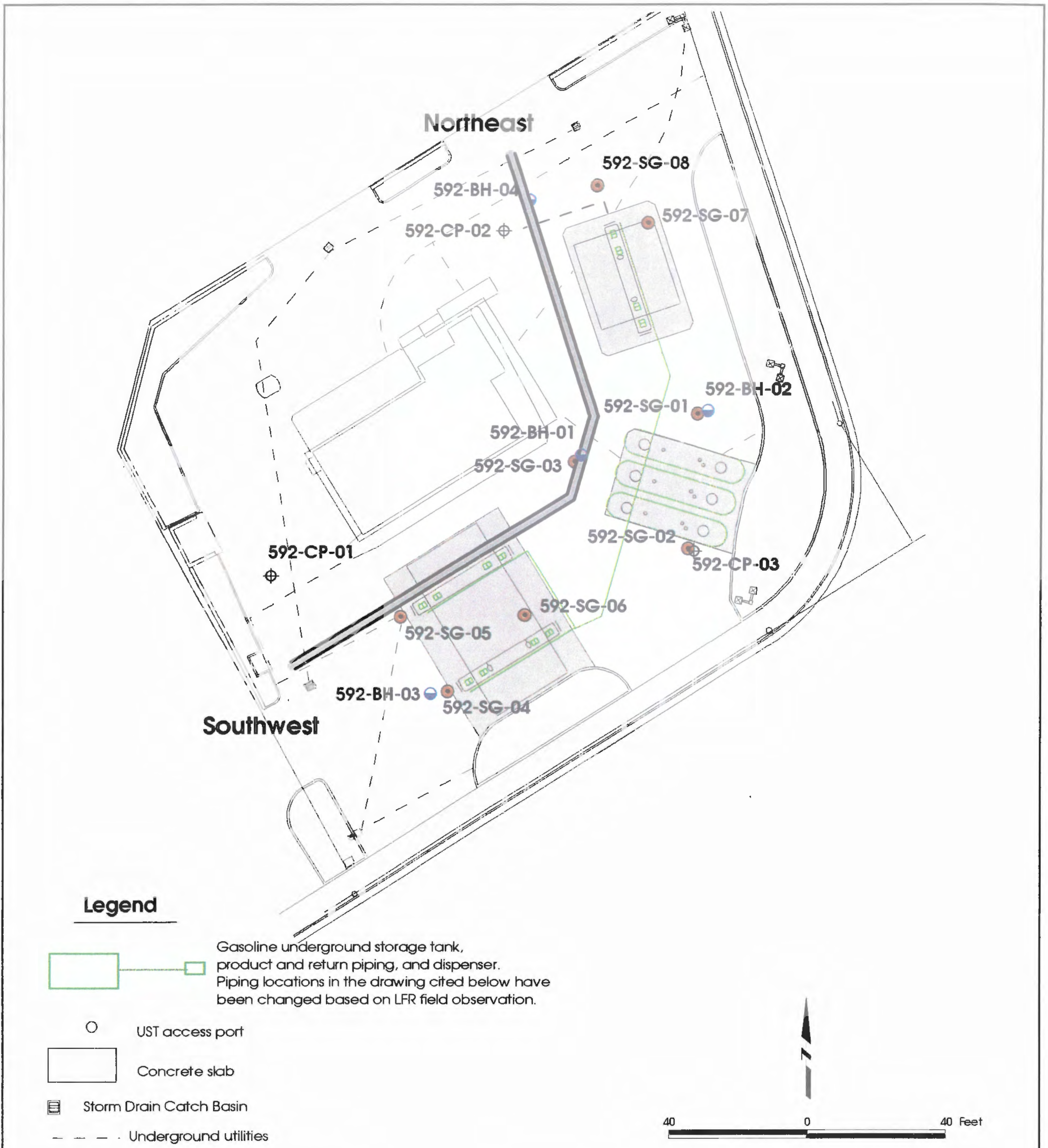
Site #592

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 5



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations in the drawing cited below have been changed based on LFR field observation.

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.

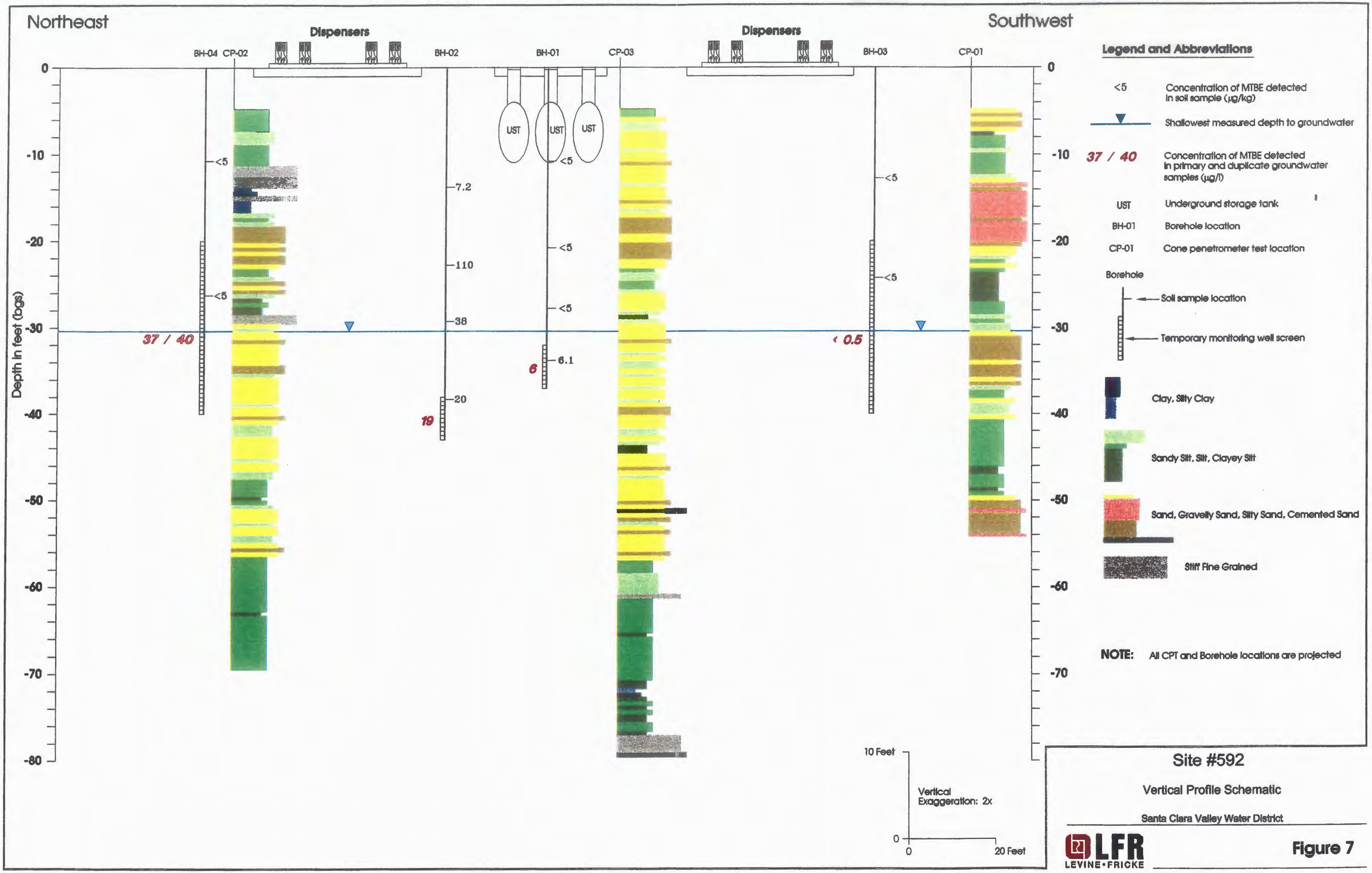
Site #592

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6


Northeast
Southwest
Dispensers
Dispensers
BH-04
CP-02
BH-02
BH-01
CP-03
BH-03
CP-01
UST
UST
UST
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
-80
<5
<5
<5
<5
<5
<5
<5
7.2
110
38
20
6.1
37 / 40
19
6
‹ 0.5
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
37 / 40 Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Temporary monitoring well screen
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand, Cemented Sand
Stiff Fine Grained
NOTE: All CPT and Borehole locations are projected
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

Site #592

Vertical Profile Schematic

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 7

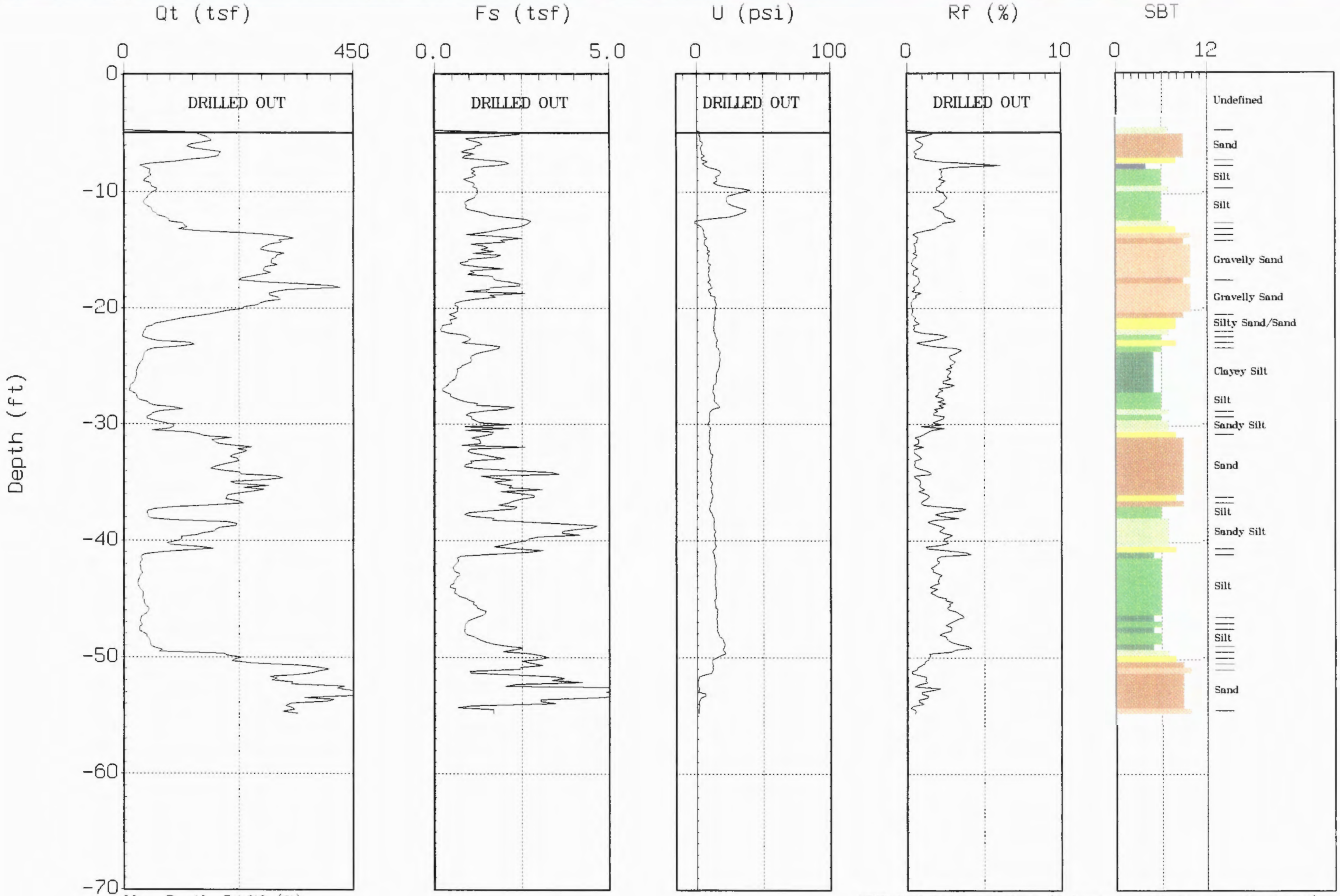
J:\ENGCAD\6730\CM#592.DWG 05/11/99 x-sec.PCP

GREGG

LFR LEVINE.FRICKE

Site: ARCO 592
Location : 592-CP-01

Geologist: Julie Sharp
Date : 03:11:99 09:32



Max. Depth: 54.79 (ft)

Depth Inc.: 0.164 (ft)

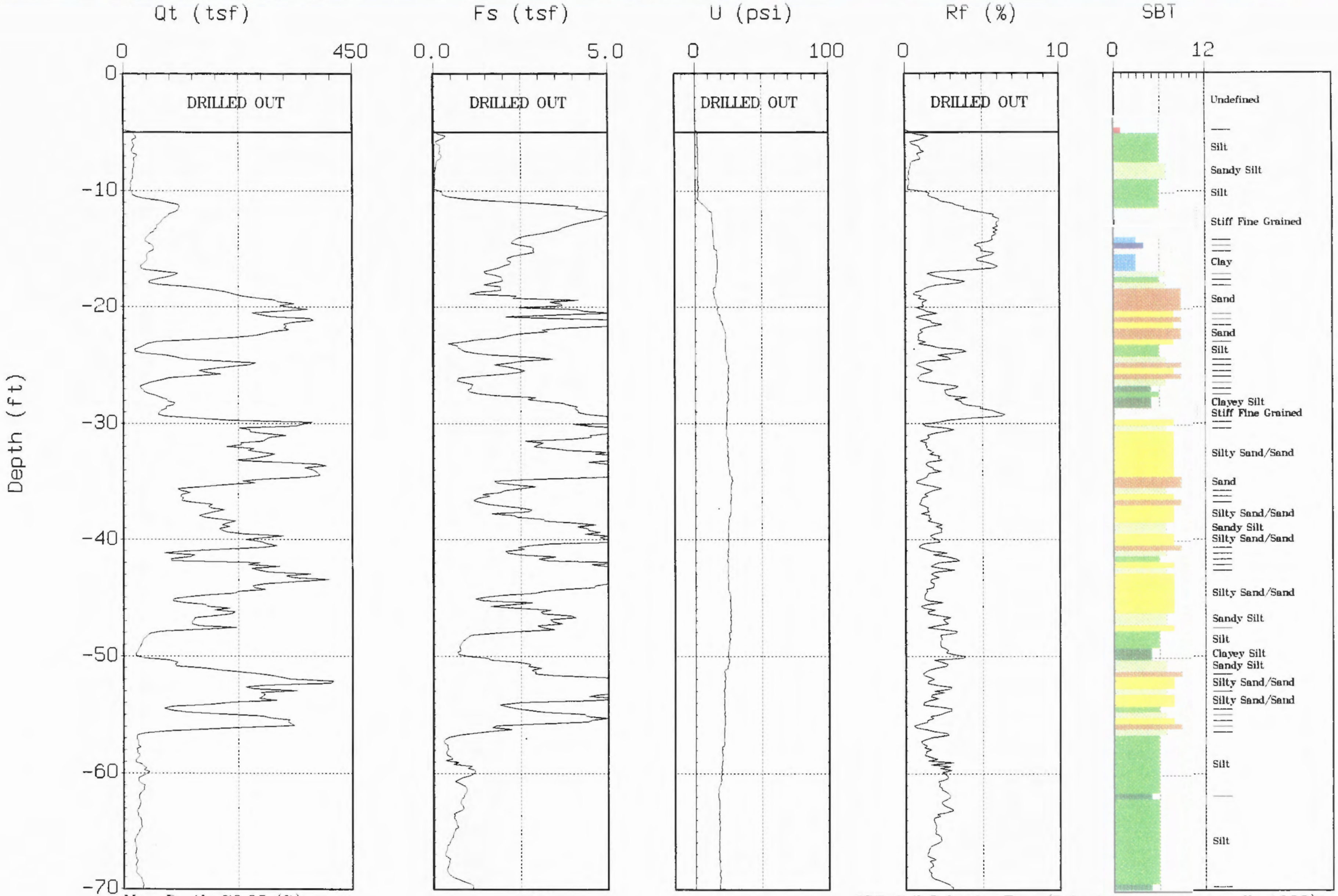
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: ARCO 592
Location : 592-CP-02

Geologist: Julie Sharp
Date : 03:11:99 12:37



Max. Depth: 70.05 (ft)

Depth Inc.: 0.164 (ft)

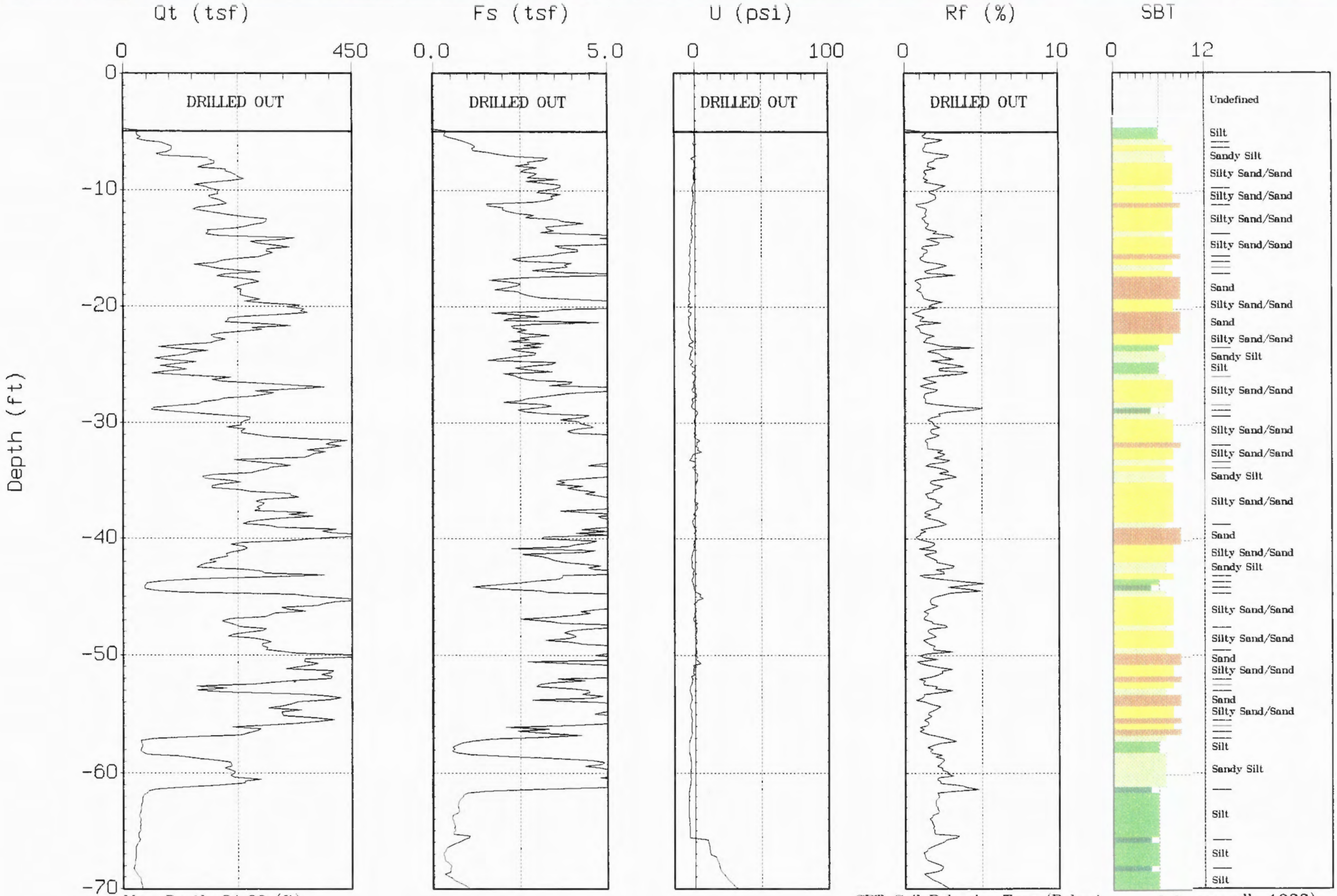
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: ARCO 592
Location : 592-CP-03

Geologist: Julie Sharp
Date : 03:11:99 14:26



Max. Depth: 81.69 (ft)

Depth Inc.: 0.164 (ft)

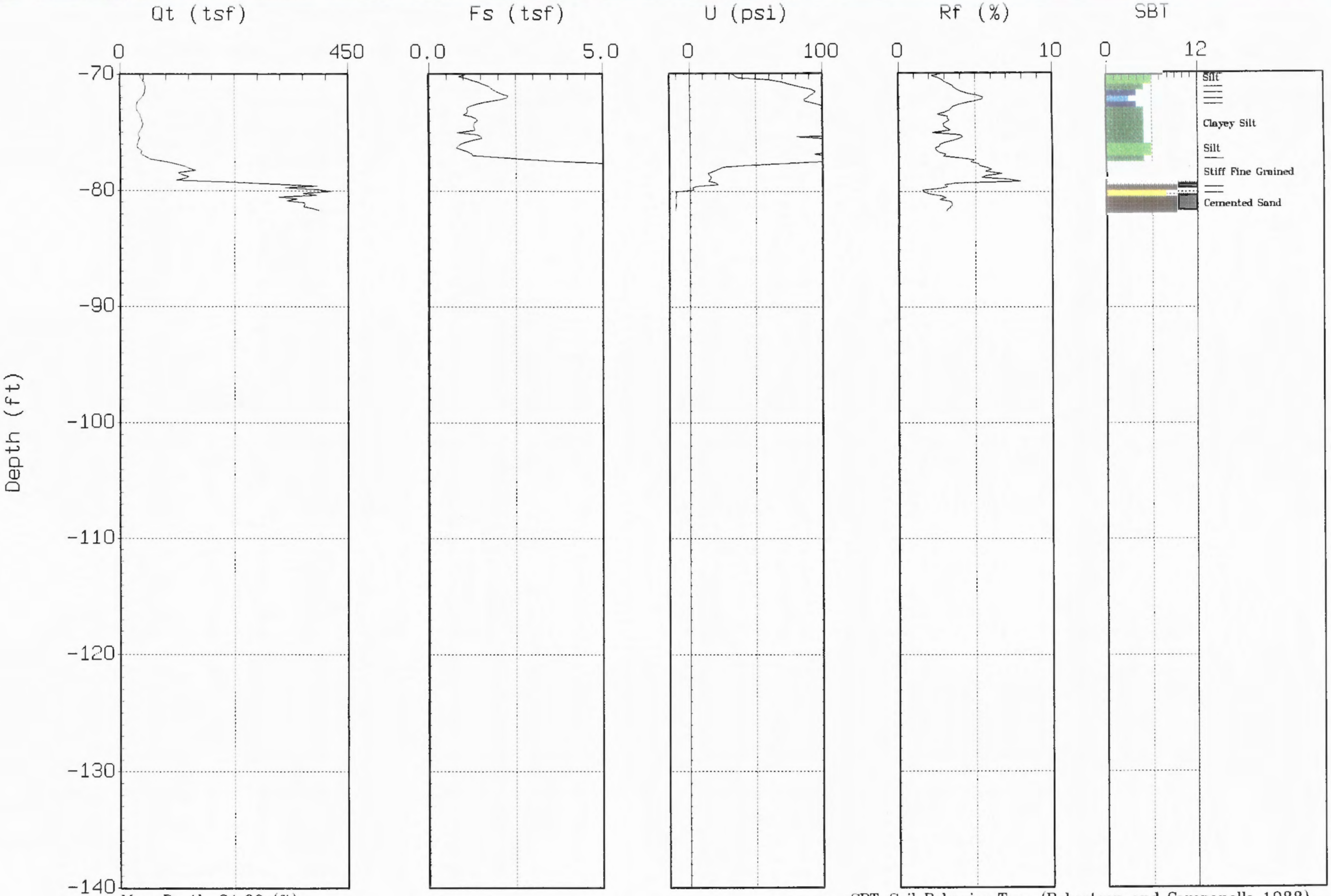
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: ARCO 592
Location : 592-CP-03

Geologist: Julie Sharp
Date : 03:11:99 14:26



Max. Depth: 81.69 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

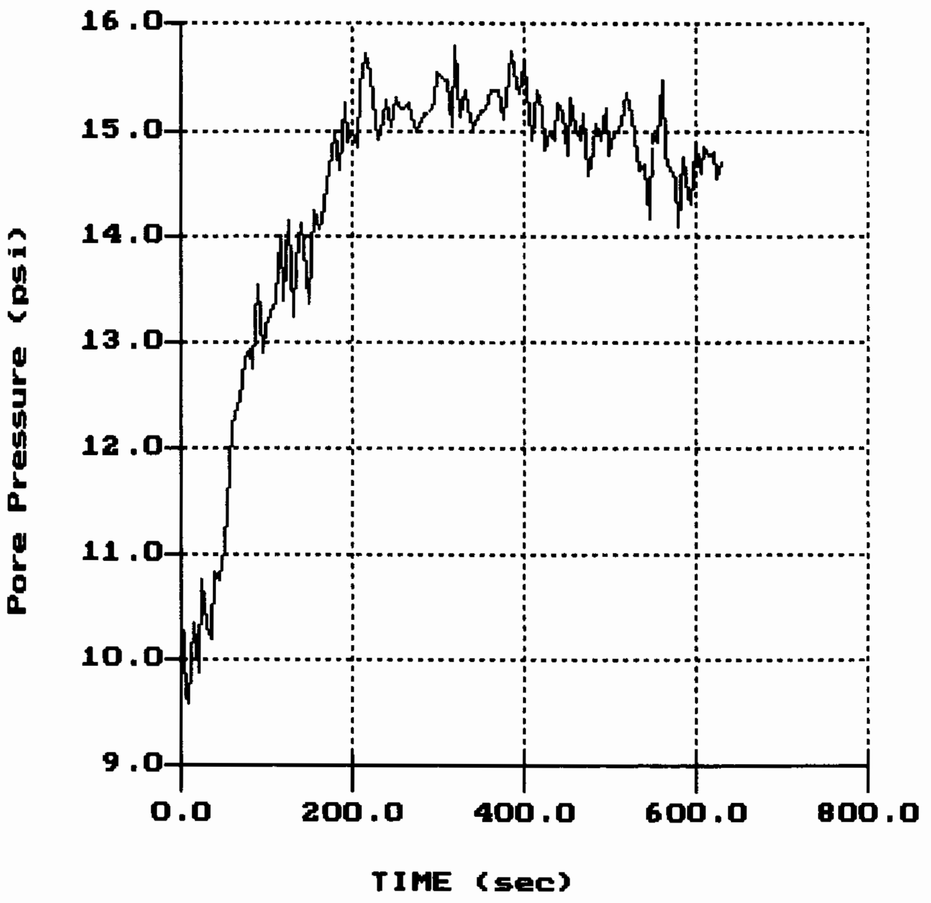
LFR LEVINE FRICKE

Hole:592-CP-01
Location:ARCO 592

Cone: 20 TON AD071
Date:03:11:99 09:32

File: 027C01.PPR
Depth (m): 15.65
(ft): 51.35
Duration : 630.0s
U-min: 9.58 10.0s
U-max: 15.79 320.0s

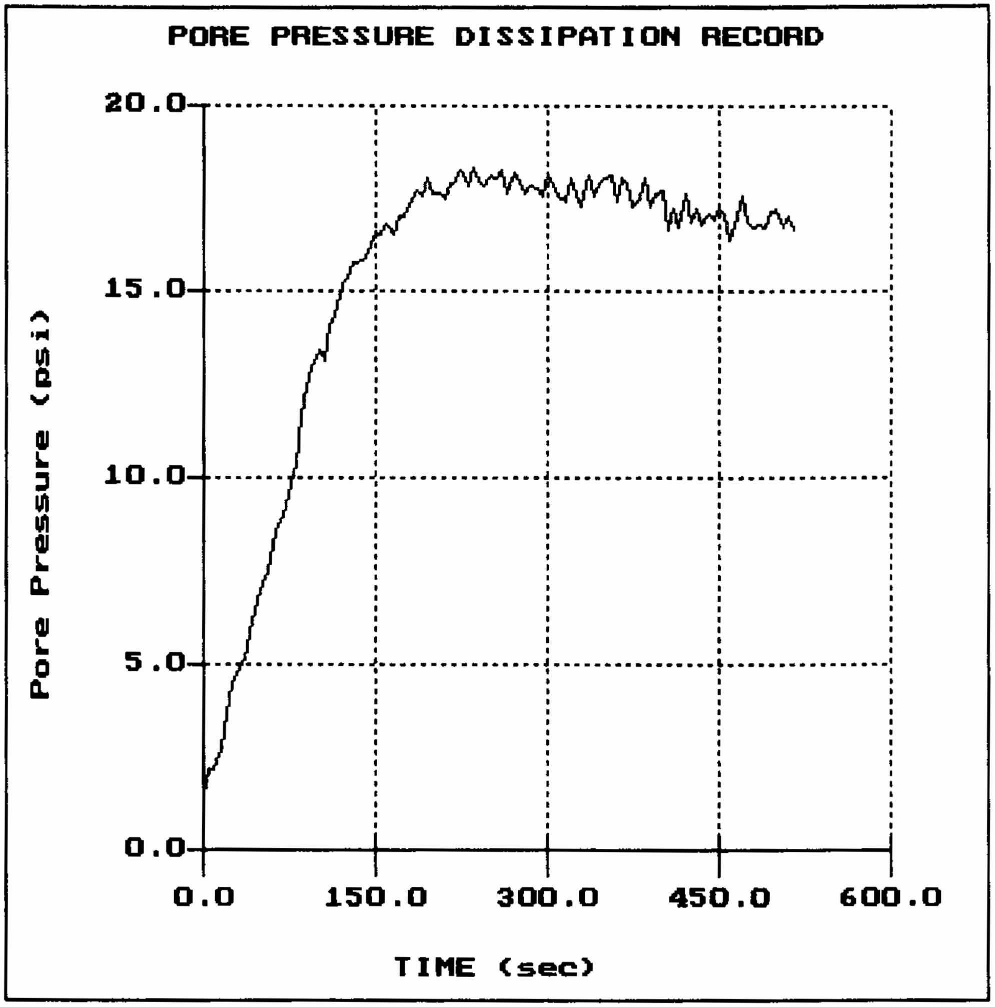
PORE PRESSURE DISSIPATION RECORD



LFR LEVINE FRICKE

Hole:592-CP-01
Location:ARCO 592

Cone: 20 TON AD071
Date:03:11:99 09:32

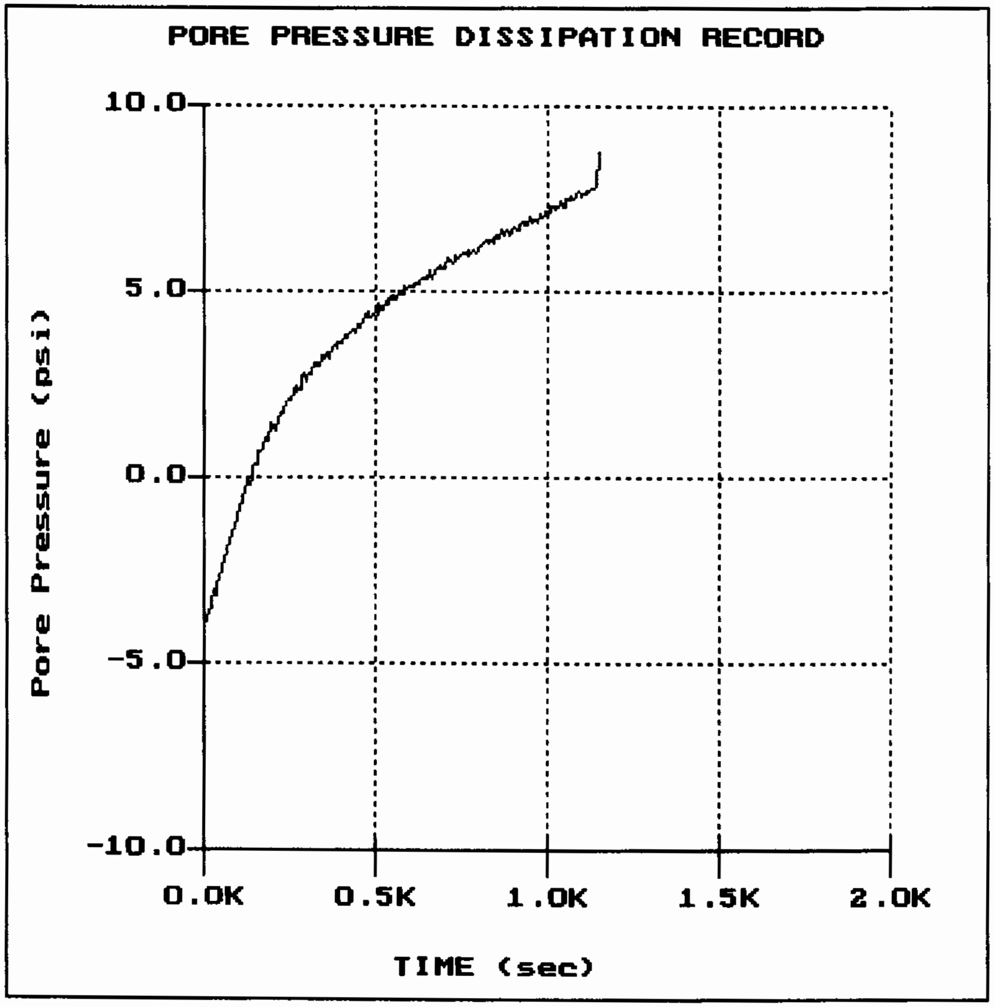


File: 027C01.PPR
Depth (m): 16.70
(ft): 54.79
Duration : 515.0s
U-min: 1.44 0.0s
U-max: 18.31 235.0s

LFR LEVINE FRICKE

Hole:592-CP-03
Location:ARCO 592

Cone: 20 TON AD046
Date:03:11:99 14:26

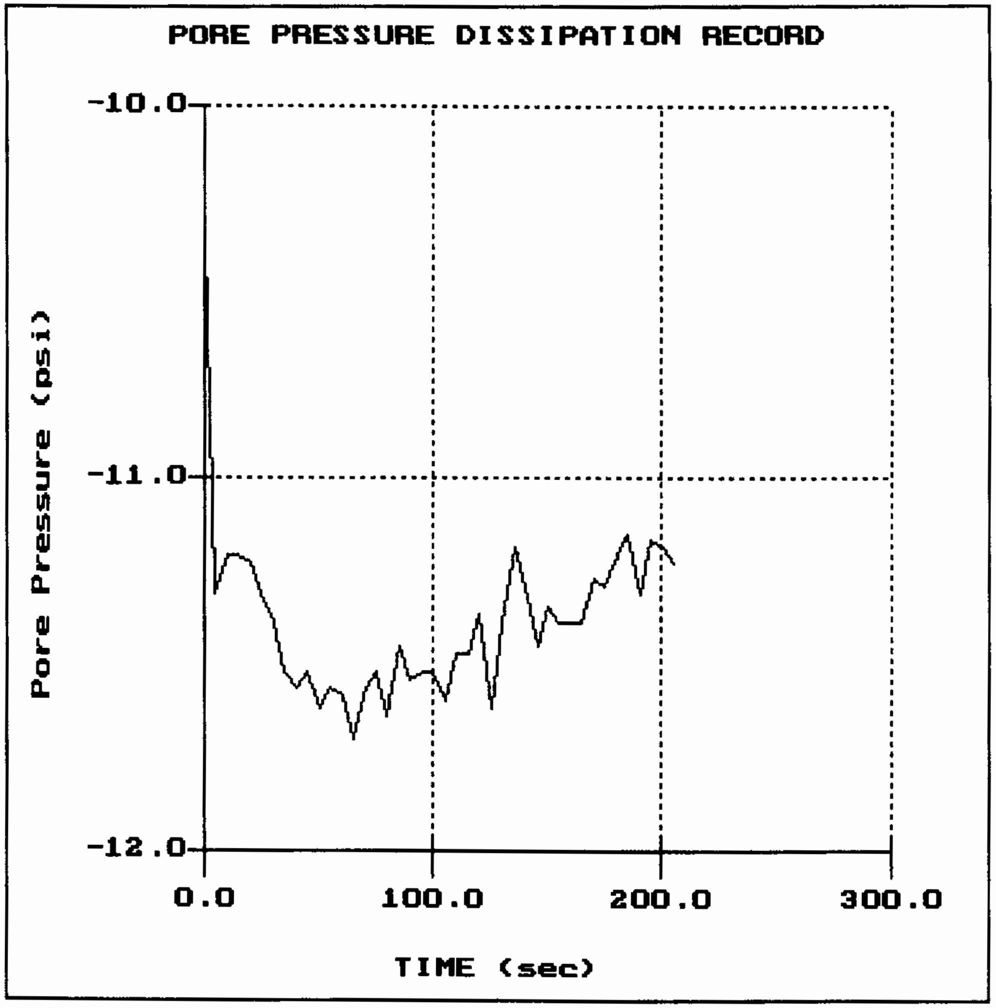


File: 027C03.PPR
Depth (m): 20.00
(ft): 65.62
Duration : 1150.0s
U-min: -3.97 0.0s
U-max: 8.77 1150.0s

LFR LEVINE FRICKE

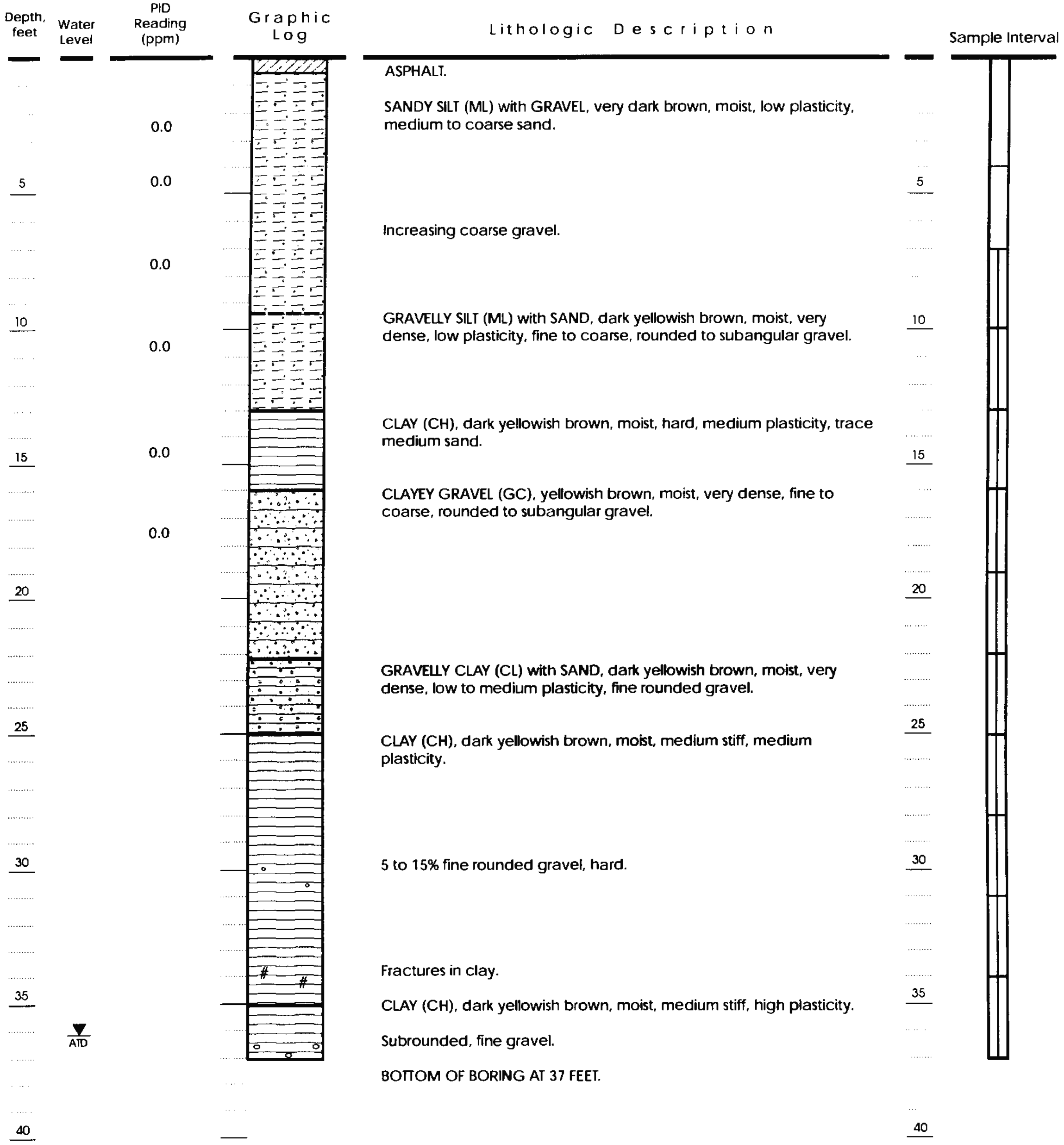
Hole:592-CP-03
Location:ARCO 592

Cone: 20 TON AD046
Date:03:11:99 14:26



File: 027C03.PPR
Depth (m): 24.90
(ft): 81.69
Duration : 205.0s
U-min: -11.70 65.0s
U-max: -10.34 0.0s

SCVWD PILOT STUDY



ASPHALT.

SANDY SILT (ML) with GRAVEL, very dark brown, moist, low plasticity, medium to coarse sand.

Increasing coarse gravel.

GRAVELLY SILT (ML) with SAND, dark yellowish brown, moist, very dense, low plasticity, fine to coarse, rounded to subangular gravel.

CLAY (CH), dark yellowish brown, moist, hard, medium plasticity, trace medium sand.

CLAYEY GRAVEL (GC), yellowish brown, moist, very dense, fine to coarse, rounded to subangular gravel.

GRAVELLY CLAY (CL) with SAND, dark yellowish brown, moist, very dense, low to medium plasticity, fine rounded gravel.

CLAY (CH), dark yellowish brown, moist, medium stiff, medium plasticity.

5 to 15% fine rounded gravel, hard.

Fractures in clay.

CLAY (CH), dark yellowish brown, moist, medium stiff, high plasticity.

Subrounded, fine gravel.

BOTTOM OF BORING AT 37 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 26, 1999
LFR Geologist:	Rodney Crother, R.G., CH.G.

EXPLANATION

☰ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

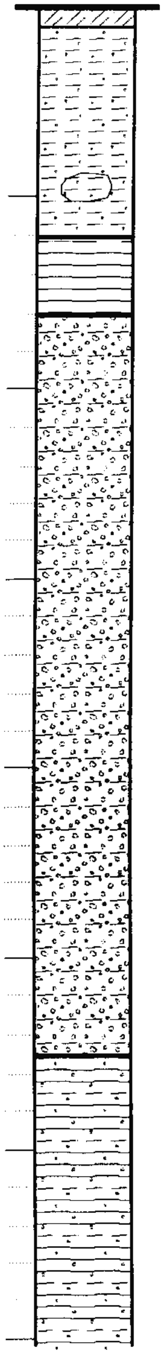
LFR
LEVINE•FRICKE

LITHOLOGY FOR 592-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

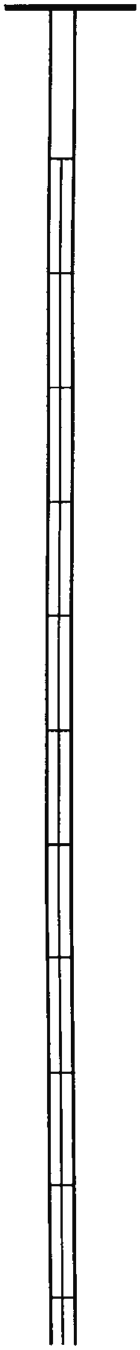
SCVWD PILOT STUDY

Graphic Log



cont....

Sample Interval



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			SANDY SILT with GRAVEL (ML), very dark brown, moist, low plasticity, medium-grained sand, some gravel.
		0.0	
5			Cobble.
			CLAY (CH), dark yellowish brown, moist, hard, medium plasticity, trace medium sand.
		0.0	
			SILTY GRAVEL (GM), yellowish brown, moist, very dense, fine to coarse, rounded to subangular gravel, trace medium-to coarse-grained sand.
10			
		0.0	
		0.0	
15			
		0.0	
20		0.0	
		0.0	
25			
		0.0	
			GRAVELLY CLAY (CH), dark yellowish brown, moist, medium stiff, medium to high plasticity, fine rounded gravel.
		0.0	
30	▼ ATD		
		0.0	Hard, low to medium plasticity, fine to coarse, rounded to subangular gravel.
35			

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 26, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
▒	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

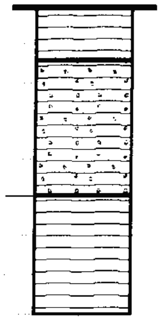
LITHOLOGY FOR 592-BH-02 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Depth, feet
		0.0	CLAY (CH), dark yellowish brown, moist, medium stiff, high plasticity.	
		0.0	SANDY CLAY (CH) with GRAVEL, very dark brown, wet(?), medium stiff, medium to high plasticity, medium to coarse sand.	
40			CLAY (CH), same as above, with gravel.	40
			BOTTOM OF BORING AT 43 FEET.	
45				45
50				50
55				55
60				60
65				65
70				70

Graphic Log



Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 26, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ░ Sand
- ░ Gravel

PID - Photoionization Detector

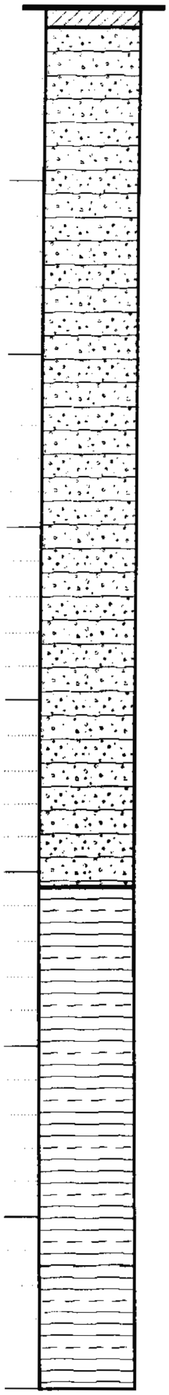
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 592-BH-02 *(page 2 of 2)*

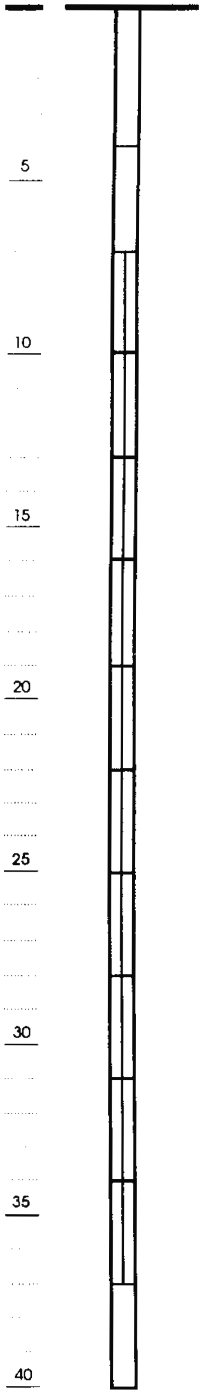
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			CLAYEY GRAVEL (GP), dark brown, moist, dense, subrounded gravel, clasts up to greater than 1.5-inch diameter.
5			
		0.0	
		0.0	
10			Slow hand drilling.
		0.0	
15			
		0.0	
		0.0	
20			
		0.0	
		0.0	
25			
		0.0	SILTY CLAY (CL), brown, moist to very moist, soft, medium to high plasticity, occasional small 1/4-inch diameter gravel, trace fine sand.
30			
		0.0	
		0.0	
35			
		0.0	
			Increased fine sand.
		0.0	
40			BOTTOM OF BORING AT 40 FEET.

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 29, 1999
LFR Geologist: Andy Lojo, R.G., CH.G.

EXPLANATION

☰	Clay
▤	Silt
▒	Sand
▨	Gravel

PID - Photoionization Detector

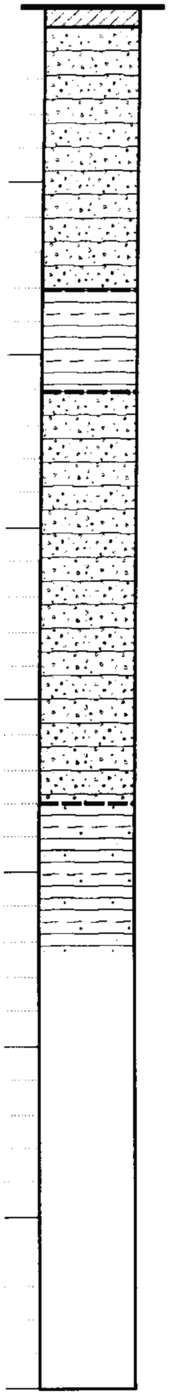
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 592-BH-03 *(page 1 of 1)*

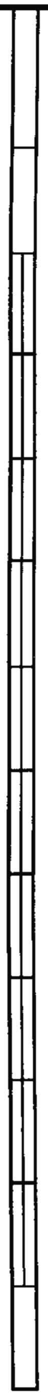
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			CLAYEY GRAVEL (GP), dark brown, slightly moist, dense, subrounded gravel up to greater than 1.5-inch diameter, trace fine sand.
		0.0	
5			
		0.0	
			SILTY CLAY (CL), brown, slightly moist, hard, medium plasticity, some fine sand.
		0.0	
10			
			CLAYEY GRAVEL (GP), as above.
		0.0	
15		0.0	
		0.0	
20			
		0.0	
			SILTY CLAY (CL), brown, very moist, soft, medium to high plasticity, some fine sand, occasional 1/4-inch diameter rounded gravel.
		0.0	
25			
		0.0	
30			
			No sampling.
			Drive to 40 feet to collect groundwater samples.
35			
40			BOTTOM OF BORING AT 40 FEET.

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 29, 1999
LFR Geologist: Andy Lojo, R.G., CH.G.

EXPLANATION

- Clay
- Silt
- Sand
- Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 592-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 593

ARCO
860 W. Fremont Avenue
Sunnyvale, California 94087

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Sunnyvale Department of Public Safety, Division of Fires and Public Safety, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists of interbedded sands, gravels, and silts to approximately 100 feet below ground surface (bgs). The shallowest depth to groundwater measured was approximately 97 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 12,000-gallon double-walled USTs constructed of fiberglass, with fiberglass reinforced plastic exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection.

RESULTS

MtBE was detected in 3 of 19 soil-gas samples collected from the site at concentrations ranging from 0.033 µg/l to 7.8 µg/l. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 17 of the 19 soil-gas samples at concentrations ranging from 0.0048 µg/l (benzene) to 3.2 µg/l (toluene). No MtBE or petroleum hydrocarbons were detected in soil or groundwater samples collected at this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Case closed in 1991. See File Review Comments below.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes, see Comments below
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Release discovered during UST removal in 1988. TPH-g detected in soil at concentrations up to 661 ppm. Soil samples collected from 3 soil borings at depths ranging from 20 to 60 feet bgs did not indicate the presence of TPHg. Case closure granted by SCVWD in September 1991.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available? No

Date of last test:	Unknown
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Ball Float
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Unknown
Under island containment present?	No
Under island containment monitoring:	None
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes (Ronan X76)
Type:	Did not Shut-Off upon functional test
Vents:	
Vent type:	Manifold
Vent piping:	Single walled
Condition of UST turbine sump:	Poor
Condition of UST flex line sump:	Poor
Vapor recovery system:	Balanced
Years of operation since upgrade:	Since early to mid- 1990
Years of operation as fueling facility:	Approximately 29 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Last Services 12/94 per sticker on alarm control box
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	No
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	Not available
Spill log comments:	Not applicable
Personnel training:	Poor

Comments:

Operator on-site had very little knowledge of the system.

SITE INSPECTION

Condition of apron around pumps:	Fair

Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	Toward W. Fremont Street and catch basins
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	No
Name of surface water:	
Type of surface water:	

Comments:

Additional contacts noted. There is an above ground drinking water supply tank to the south.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1-UNL-R

Date installed:	8/88
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2-UNL-R

Date installed:	8/88

Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3-UNL-P

Date installed:	8/88
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Yes
Date overfill protection equipment installed:	Yes
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #593
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
593-SG-01	03/25/99	8	<5	<100	<1	1.2	<1	<1	<1	
		13	<5	<100	<1	2.3	<1	3.1	<1	
		20	<5	<100	<1	2	<1	<1	<1	
593-SG-02	03/25/99	8	<5	<100	<1	3.2	<1	<1	<1	
		18.5	<5	<100	<1	<1	<1	1.5	<1	
593-SG-02-DUP		18.5	<5	<100	<1	1	<1	<1	<1	
593-SG-03	03/25/99	8	<5	<100	<1	1.3	<1	1.5	<1	
593-SG-04	03/25/99	8	<5	<100	<1	1	<1	<1	<1	
		13	<5	<100	<1	1.6	<1	2.3	1.4	
		20	<5	<100	<1	1.3	<1	<1	<1	
593-SG-05	03/26/99	8	<5	<100	<1	<1	<1	1	<1	
		13	<5	<100	<1	1.7	<1	<1	<1	
		20	<5	<100	<1	<1	<1	<1	<1	
593-SG-05-SPL		20	0.033	NA	0.0048 J	0.022	0.0063 J	0.029	0.0094 J	(a)
593-SG-06	03/26/99	8	<5	<100	<1	1.4	<1	<1	<1	
		13	5	<100	<1	2.1	<1	1.2	<1	
593-SG-07	03/26/99	8	<5	<100	<1	3.1	1.3	1.6	<1	
		13	6.2	<100	<1	2.3	1.4	1.2	<1	
593-SG-07-DUP		13	7.8	<100	<1	2	<1	2	1.2	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.0099 ug/L) and Methanol (0.48 ug/L).

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #593
Santa Clara Valley Water District

	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
593-BH-01	03/30/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.0-23.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		35.5-36.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
593-BH-02	03/31/99	13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		26.0-26.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		36.0-36.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		91.0-91.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 593
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
593-BH-01	03/30/99	100.0-100.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
593-BH-01-DUP		100.0-100.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
593-BH-02	03/31/99	93.0-100.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

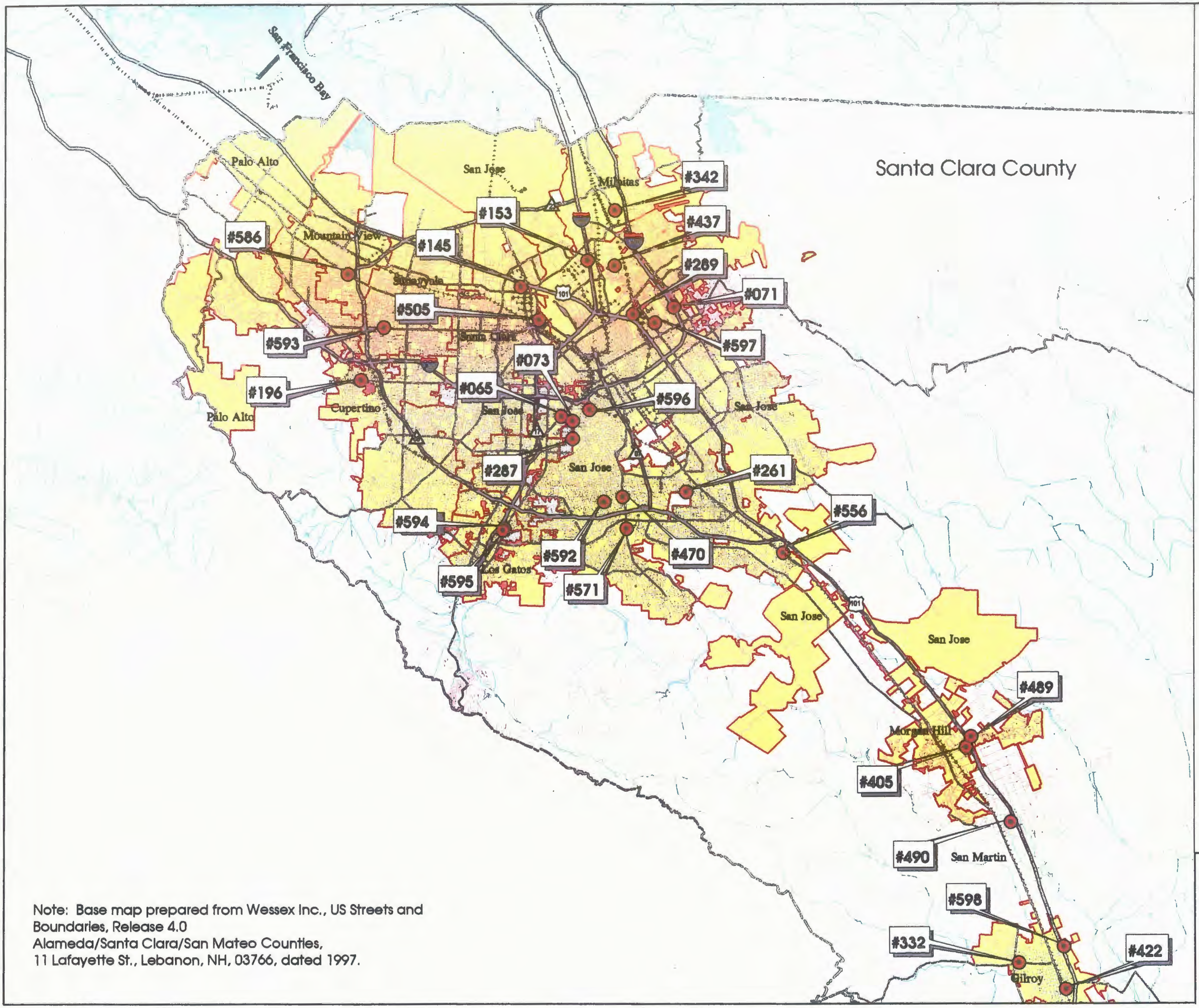
Table 4
Summary of Physical Parameters for Soil Samples - Site #593
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
593-BH-02	13.0 - 13.5	Brown silty sand/sandy silt	0.04	14.73	97.6	85.0	49.54
	35.5 - 36.0	Gray brown gravelly sand	0.02	4.86	110.4	105.2	37.54

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

●	Site Location
🟨	City within Santa Clara County
	Santa Clara County Boundary
	Rivers, Creeks, and Streams
	Freeway
	Principal Arterials
	Local Streets and Roads
	Railroad Lines

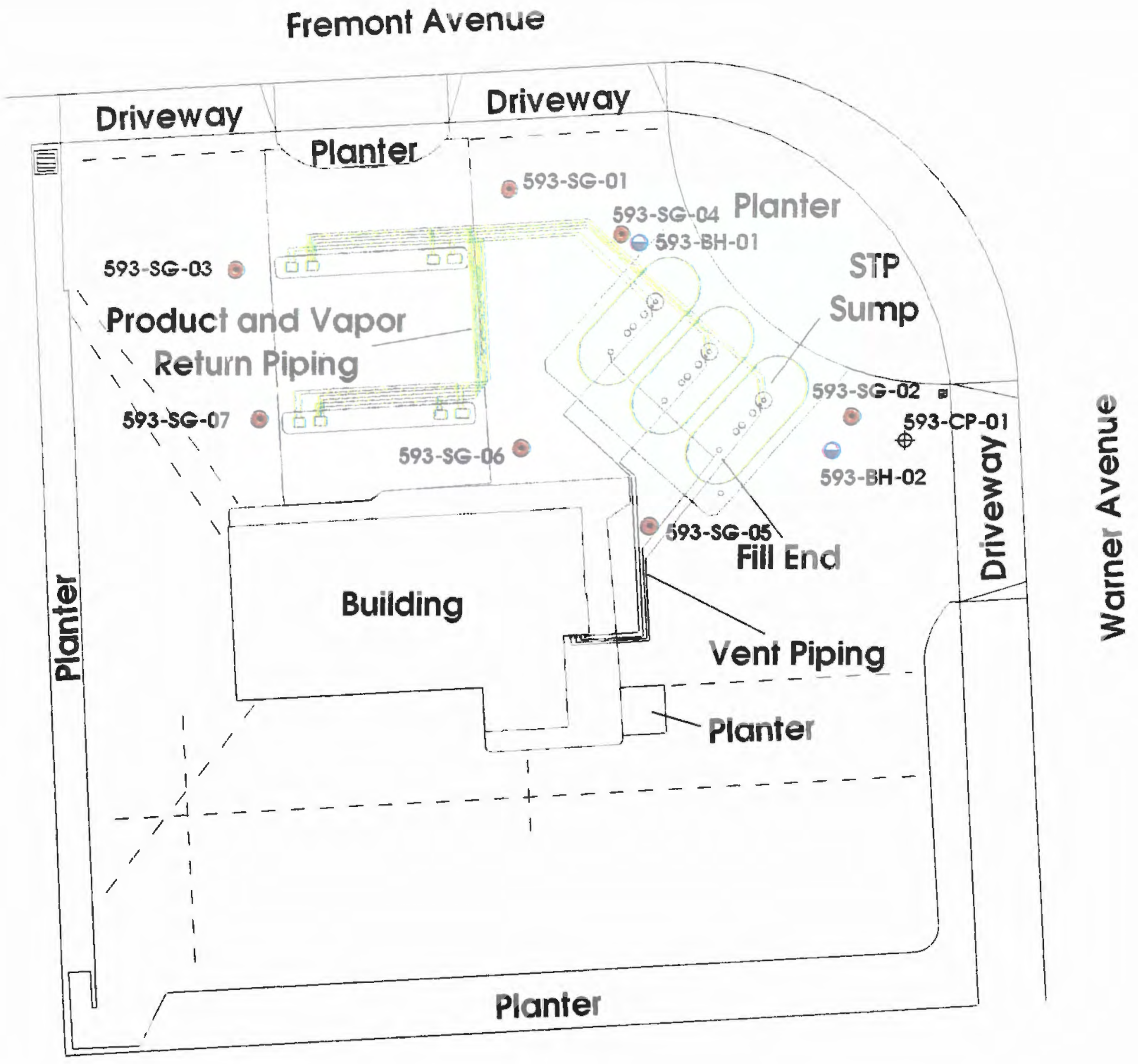
3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

Gasoline underground storage tank, product and return piping, and dispenser.

○ UST access port

Concrete slab

Storm Drain Catch Basin

– – – – Underground utilities

● Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Tank and Line Replacement Fremont Ave., Sunnyvale, California, Sheet 1 Site Plan, ARCO Petroleum Products Company, by Robert H. Lee & Associates, Inc., dated 4/25/88, and revised 6/27/88 and 7/1/88. Piping runs are shown schematically.

30 0 30 Feet

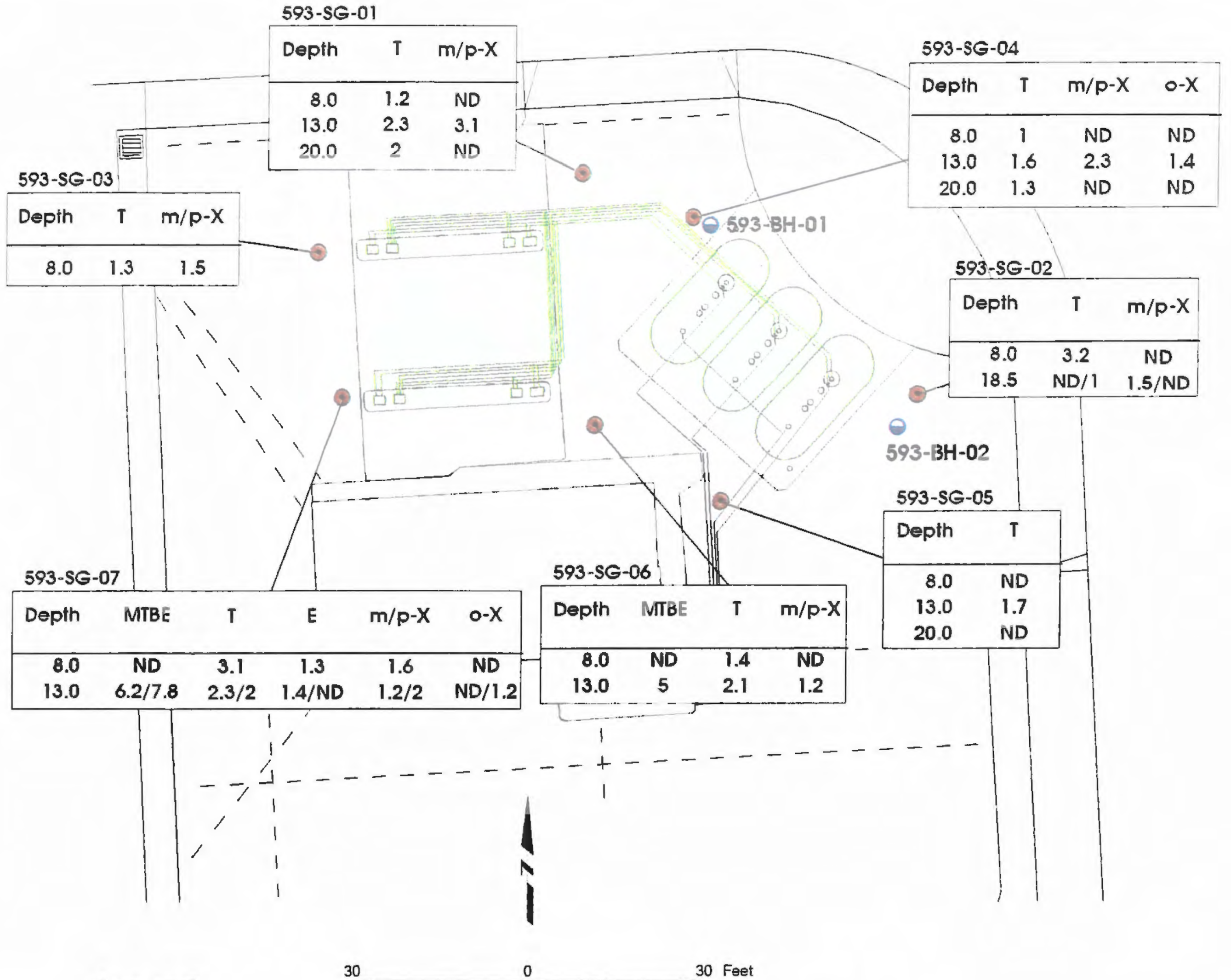
Site #593

Site Plan

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 2



593-SG-01

Depth	T	m/p-X
8.0	1.2	ND
13.0	2.3	3.1
20.0	2	ND

593-SG-04

Depth	T	m/p-X	o-X
8.0	1	ND	ND
13.0	1.6	2.3	1.4
20.0	1.3	ND	ND

593-SG-03

Depth	T	m/p-X
8.0	1.3	1.5

593-SG-02

Depth	T	m/p-X
8.0	3.2	ND
18.5	ND/1	1.5/ND

593-SG-05

Depth	T
8.0	ND
13.0	1.7
20.0	ND

593-SG-07

Depth	MTBE	T	E	m/p-X	o-X
8.0	ND	3.1	1.3	1.6	ND
13.0	6.2/7.8	2.3/2	1.4/ND	1.2/2	ND/1.2

593-SG-06

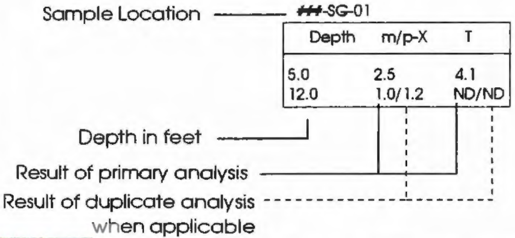
Depth	MTBE	T	m/p-X
8.0	ND	1.4	ND
13.0	5	2.1	1.2

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

– – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

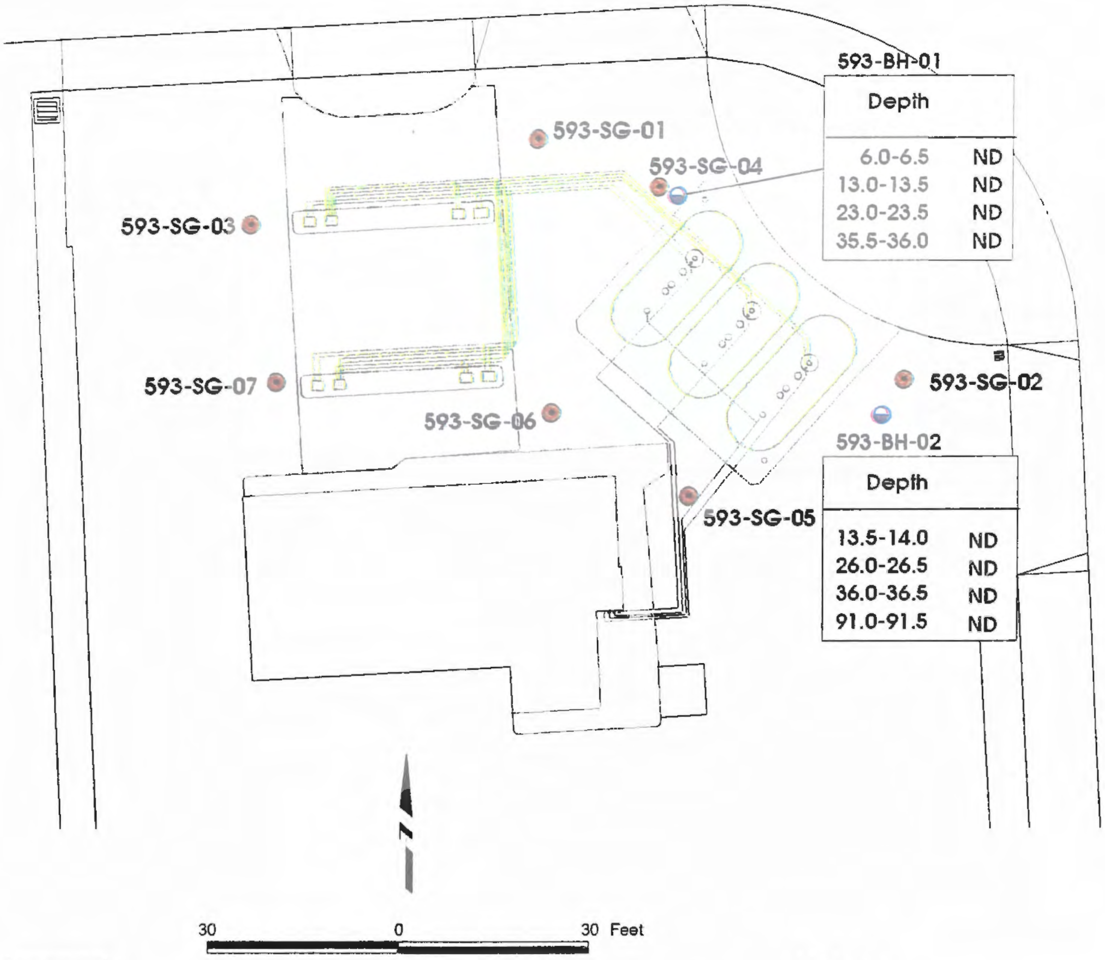
Site #593

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

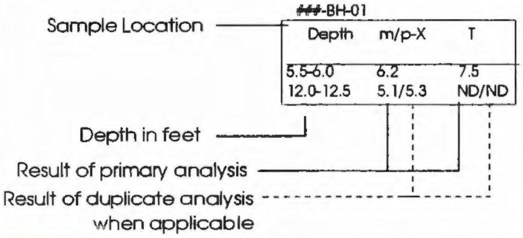
Figure 3



Legend

- ⊖ Soil and groundwater sampling location
- ● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

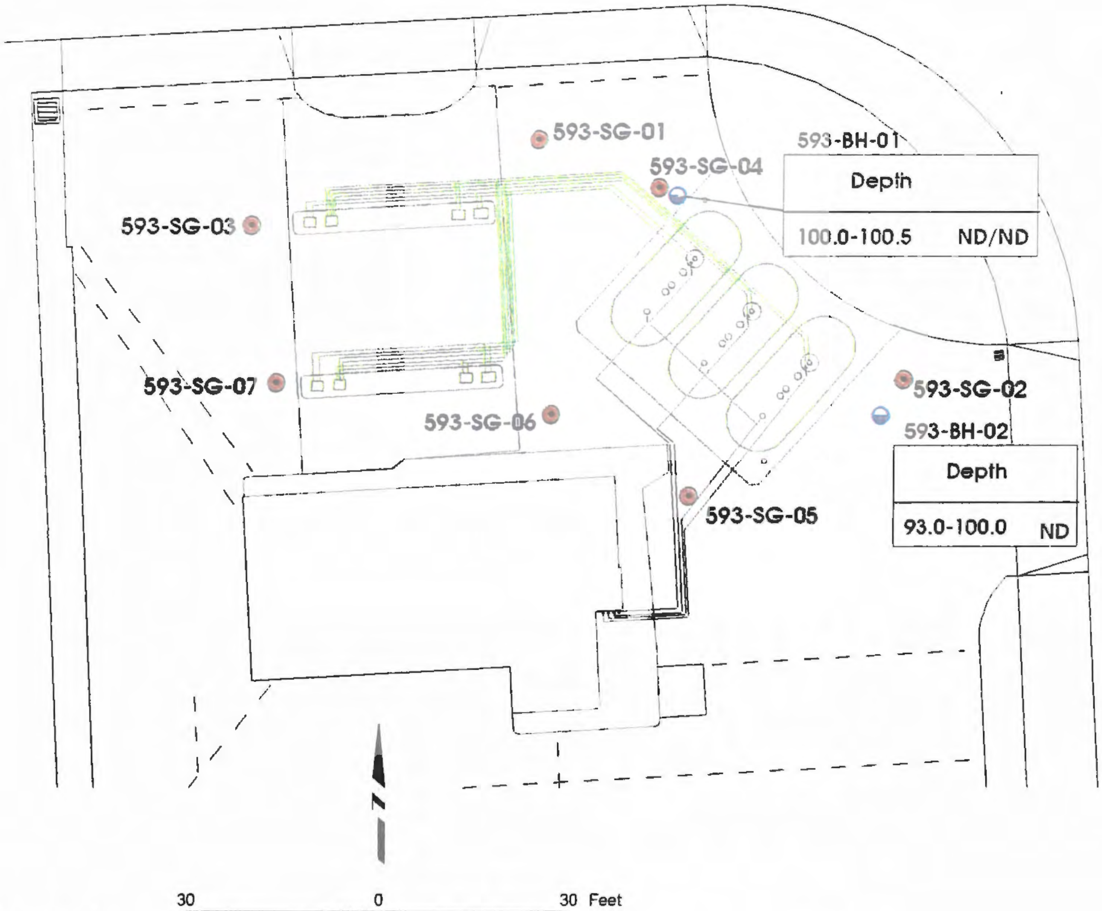
Site #593

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

⊖ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0 12.0-12.5	6.2 5.1/5.3	7.5 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

- - - Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

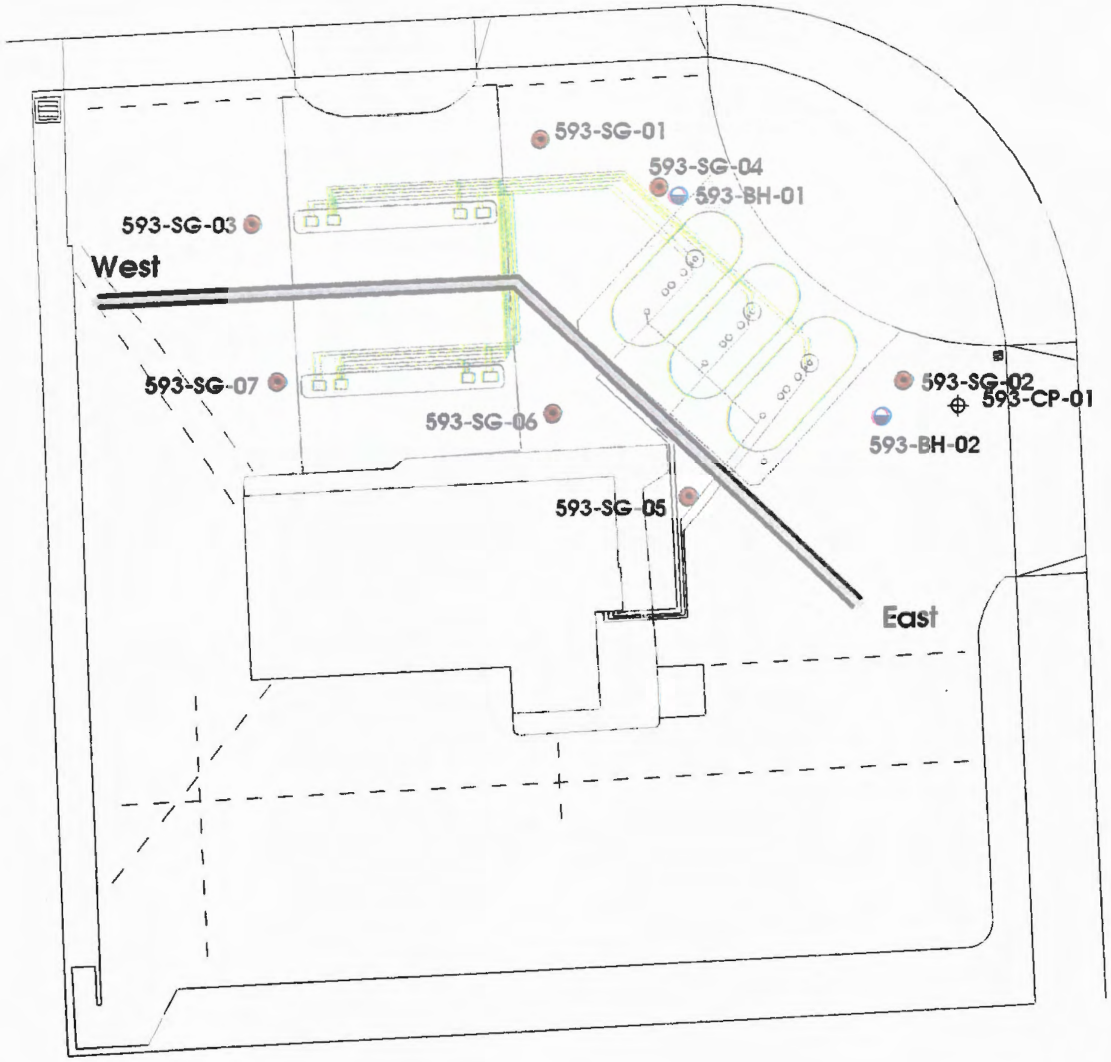
Site #593

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5



Legend

Gasoline underground storage tank, product and return piping, and dispenser. Piping locations in the drawing cited below have been changed based on LFR field observation.

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

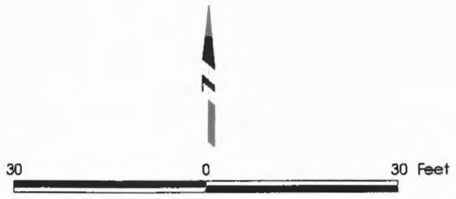
– – – Underground utilities

◓ Soil and groundwater sampling location

● Soil-gas sampling location

⌖ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.



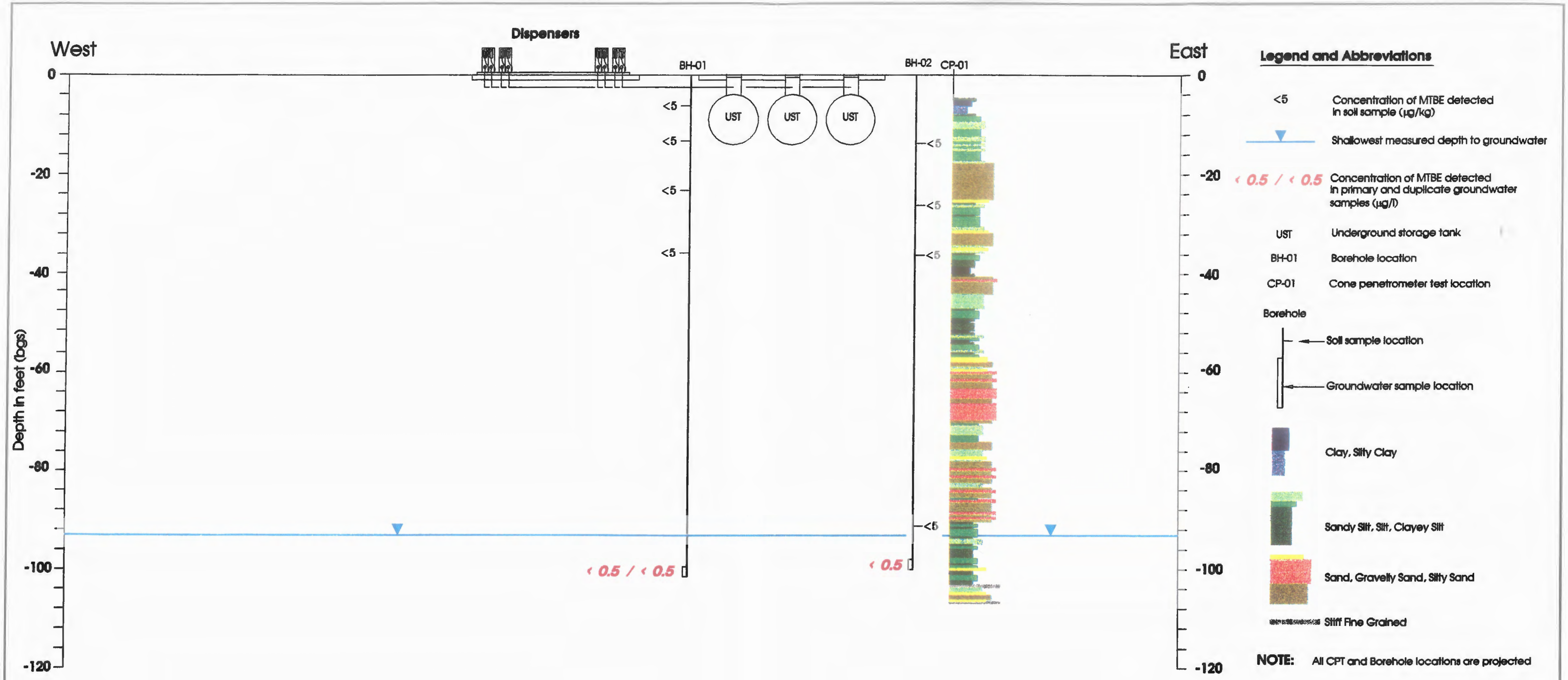
Site #593

Site Plan Showing Orientation of Vertical Profile

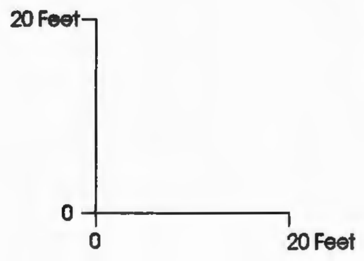
Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6



West
East
Dispensers
BH-01
BH-02
CP-01
UST
UST
UST
0
-20
-40
-60
-80
-100
-120
Depth in feet (bgs)
<5
<5
<5
<5
<5
<5
<5
<5
‹ 0.5 / ‹ 0.5
‹ 0.5
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
‹ 0.5 / ‹ 0.5 Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
Stiff Fine Grained
NOTE: All CPT and Borehole locations are projected



J:\ENGCAD\6730\CM\#593.DWG 05/18/99 x-sec.PCP

Site #593

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE•FRICKE

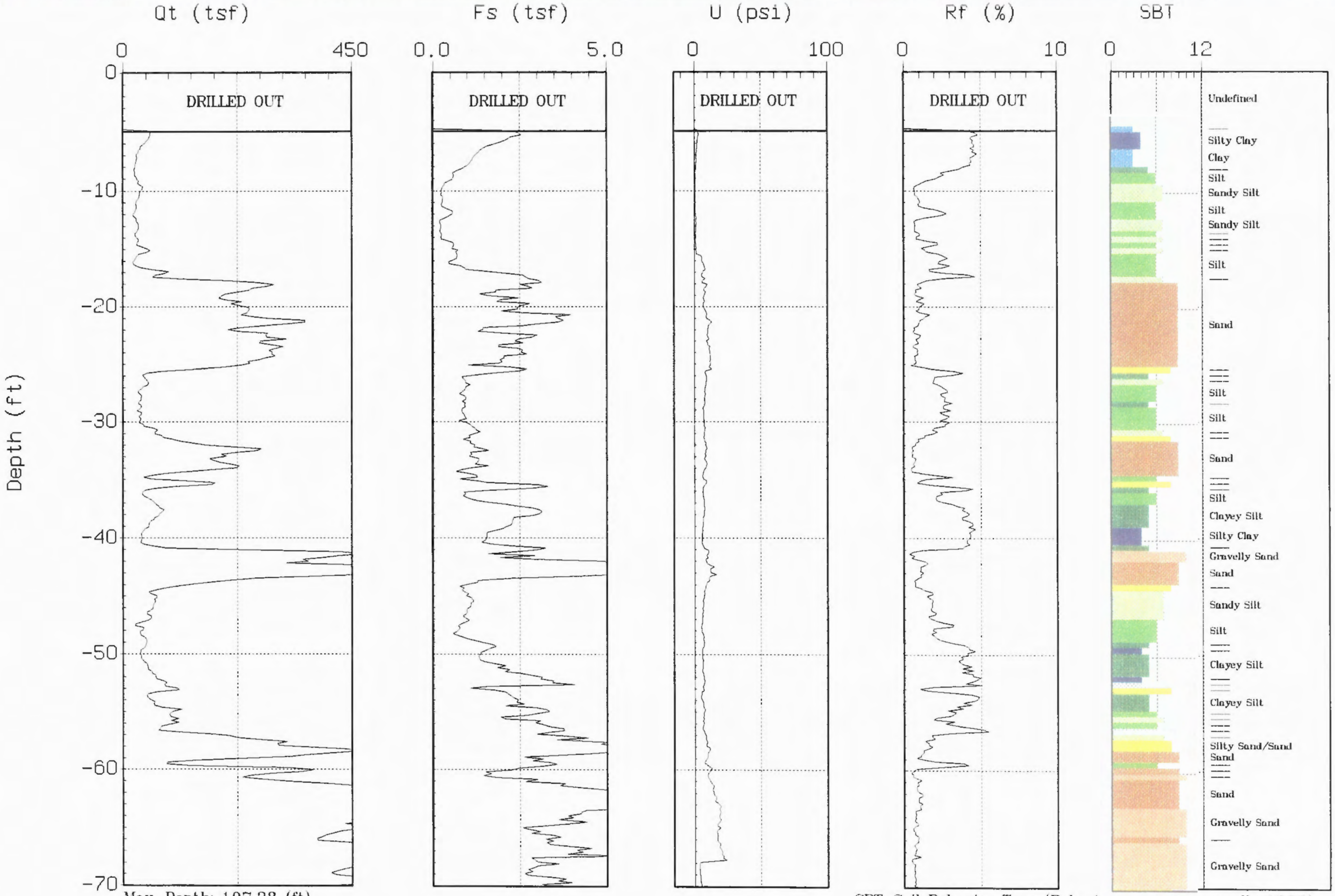
Figure 7

GREGG

LFR LEVINE.FRICKE

Site: ARCO 593
Location : 593-CP-01

Geologist: Julie Sharp
Date : 03:11:99 17:25



Max. Depth: 107.28 (ft)

Depth Inc.: 0.164 (ft)

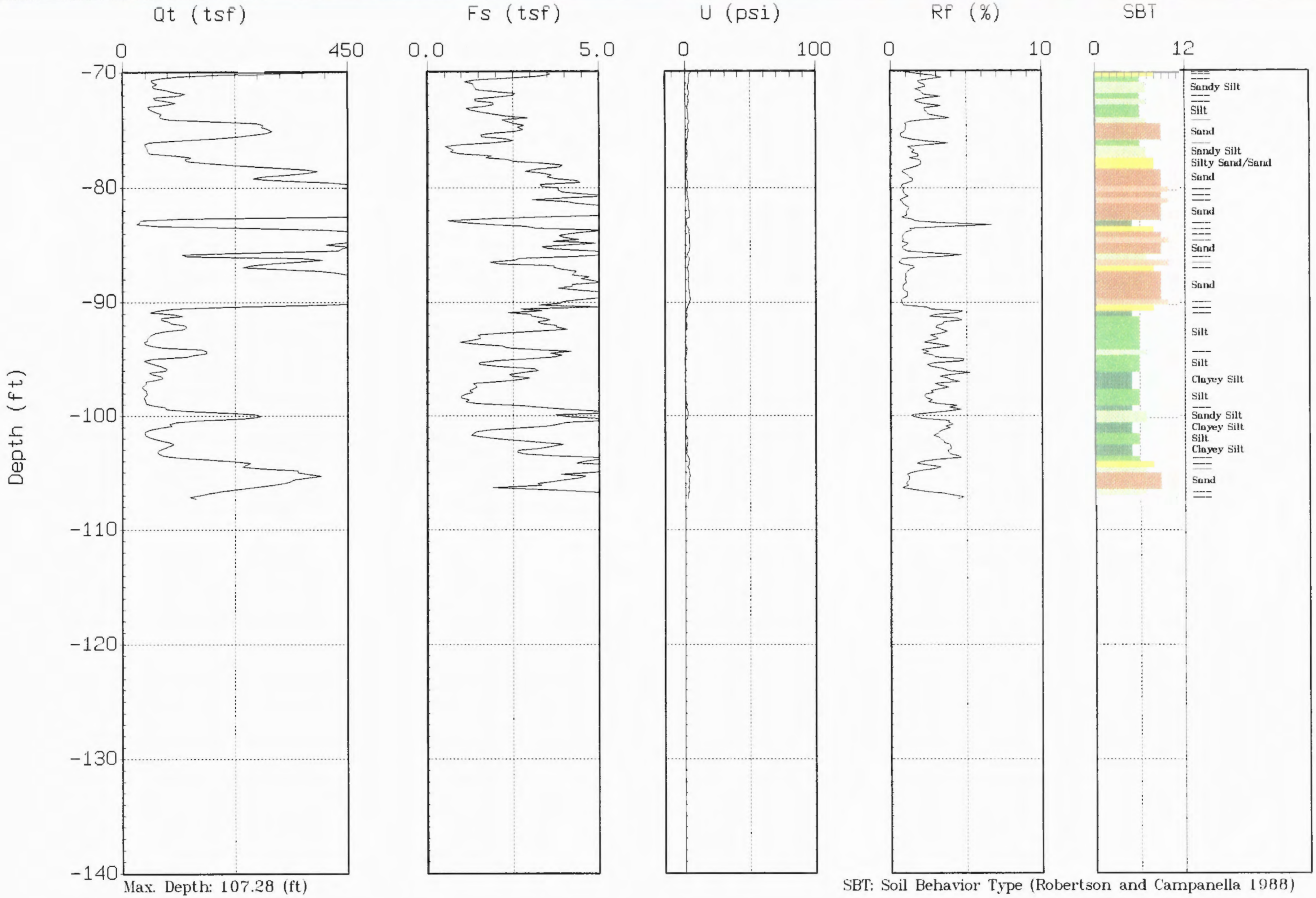
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: ARCO 593
Location : 593-CP-01

Geologist: Julie Sharp
Date : 03:11:99 17:25

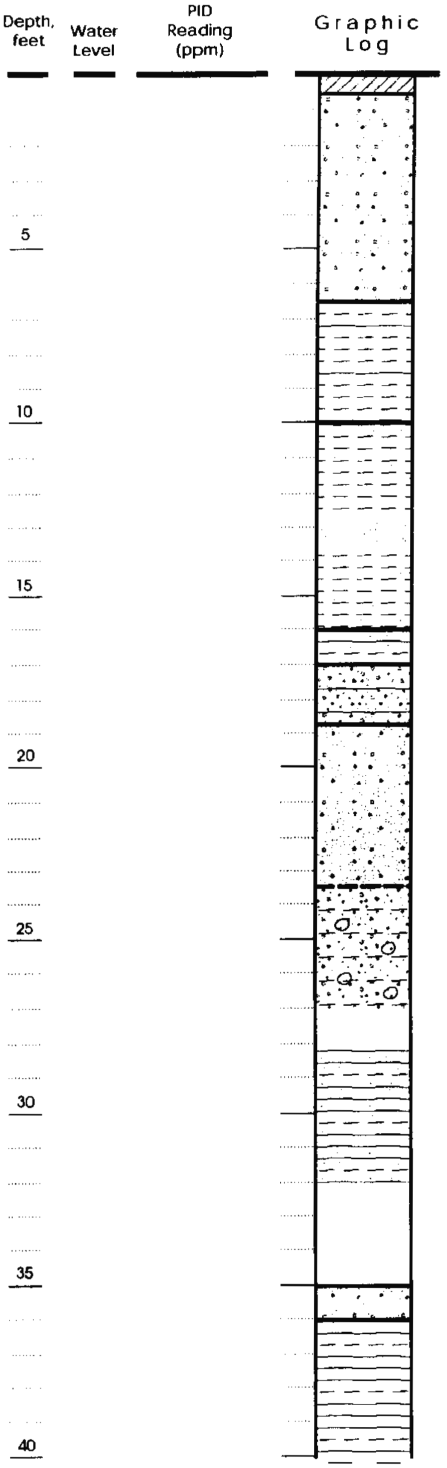


Max. Depth: 107.28 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

SCVWD PILOT STUDY



Lithologic Description

ASPHALT.

GRAVELLY SAND (CL), brown, slightly moist, stiff, very low plasticity, fine sand, coarse gravel.

CLAYEY SILT (ML), yellowish brown, slightly moist, stiff, non plastic.

SANDY SILT (ML), yellowish brown, slightly moist, soft, non plastic, very fine sand.

SAND (SP) interbed, yellowish brown, slightly moist, very loose, fine grained, poorly graded.

SANDY SILTY CLAY (CL), yellowish brown mottled with light grayish and reddish brown, moist, soft, very low plasticity.
CLAYEY SANDY GRAVEL (GC), light yellowish brown, moist, medium dense, well graded subangular, clasts to 2.5 centimeters.

GRAVELLY SAND (SW), brown, moist to very moist, medium dense, very well graded subangular to subrounded, gravel clasts to 1.5 centimeters.

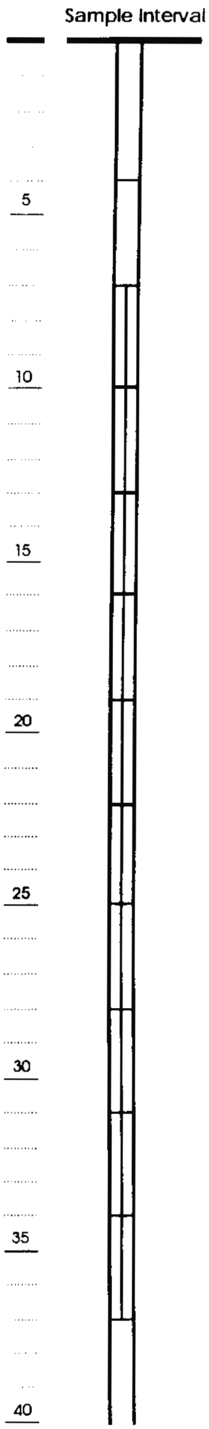
SILTY SANDY GRAVEL (GM), grayish brown, moist, medium dense, well graded to cobble size, angular to subangular.

Lithologic samples collected every 5 feet at depth greater than 25 feet.

SANDY SILTY CLAY (CL), yellowish brown, moist, soft, slight plasticity.

GRAVELLY SAND (SW), grayish brown, moist, loose, very well graded subangular sand, gravel clasts to 2 centimeters.

SILTY CLAY (CL), yellowish brown to strong brown, stiff, slight plasticity.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 30, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
⁙	Sand
⁂	Gravel

PID - Photoionization Detector

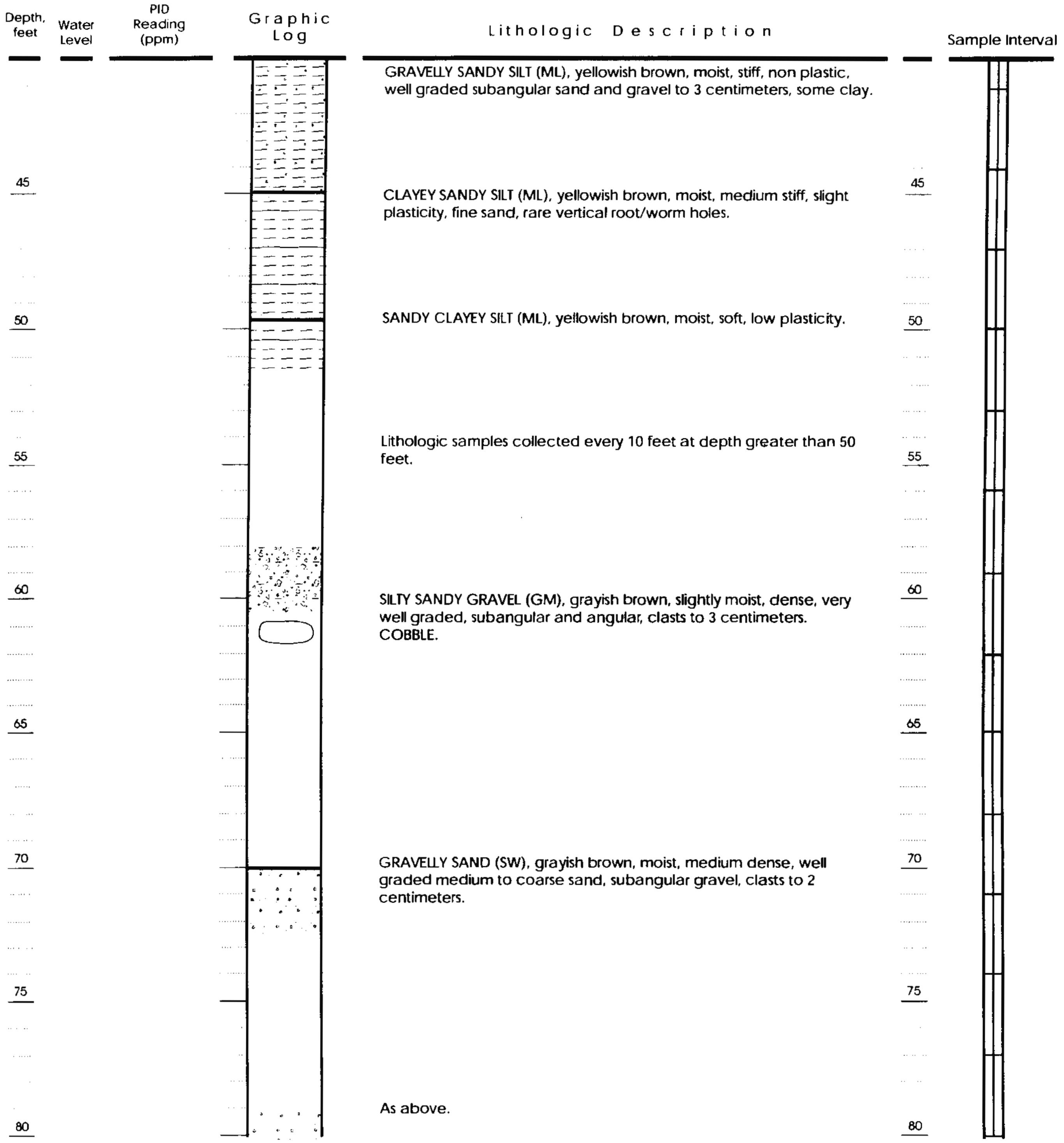
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 593-BH-01 *(page 1 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY



GRAVELLY SANDY SILT (ML), yellowish brown, moist, stiff, non plastic, well graded subangular sand and gravel to 3 centimeters, some clay.

CLAYEY SANDY SILT (ML), yellowish brown, moist, medium stiff, slight plasticity, fine sand, rare vertical root/worm holes.

SANDY CLAYEY SILT (ML), yellowish brown, moist, soft, low plasticity.

Lithologic samples collected every 10 feet at depth greater than 50 feet.

SILTY SANDY GRAVEL (GM), grayish brown, slightly moist, dense, very well graded, subangular and angular, clasts to 3 centimeters. COBBLE.

GRAVELLY SAND (SW), grayish brown, moist, medium dense, well graded medium to coarse sand, subangular gravel, clasts to 2 centimeters.

As above.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 30, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

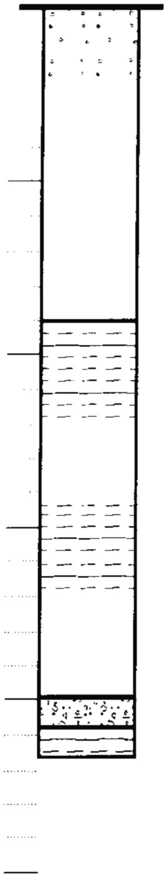
EXPLANATION

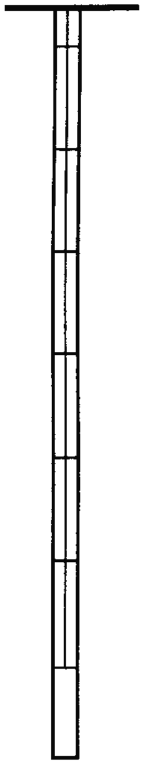
- ☰ Clay
- ▤ Silt
- ░ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			As above.
85			
90			CLAYEY SILT (ML), yellowish brown, moist, medium stiff, non plastic.
95			Medium-grained sand in clayey silt as above, very moist.
	▼ ATD		
100			SILTY SANDY GRAVEL (GM), yellowish brown, wet, loose, well graded, clasts to 2 centimeters. SANDY SILTY CLAY (CL), yellowish brown, moist, medium stiff, low plasticity. BOTTOM OF BORING AT 101.5 FEET.
105			
110			
115			
120			

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 30, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ░ Sand
- ▨ Gravel

PID - Photoionization Detector

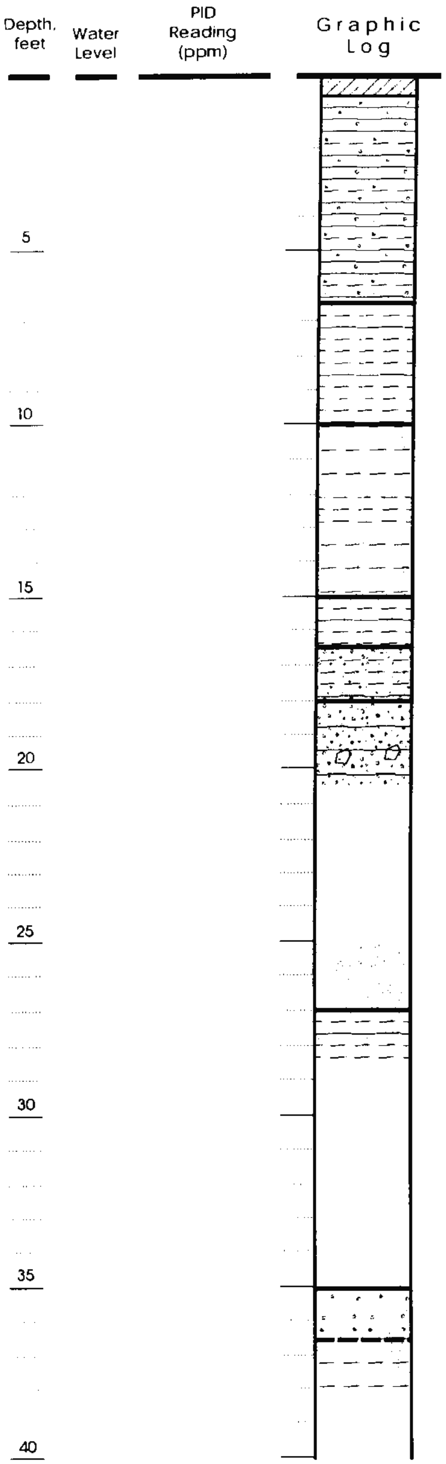
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 593-BH-01 *(page 3 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Lithologic Description

ASPHALT.

SANDY GRAVELLY SILTY CLAY (CL), brown, slightly moist, very stiff, slight plasticity, coarse angular gravel, clasts to 2.5 centimeters.

CLAYEY SILT (ML), yellowish brown, slightly moist, stiff, non plastic, common vertical root/worm holes.

SILTY SAND (SM), yellowish brown, slightly moist, loose, poorly graded very fine sand.

SANDY SILT (ML) interbed.

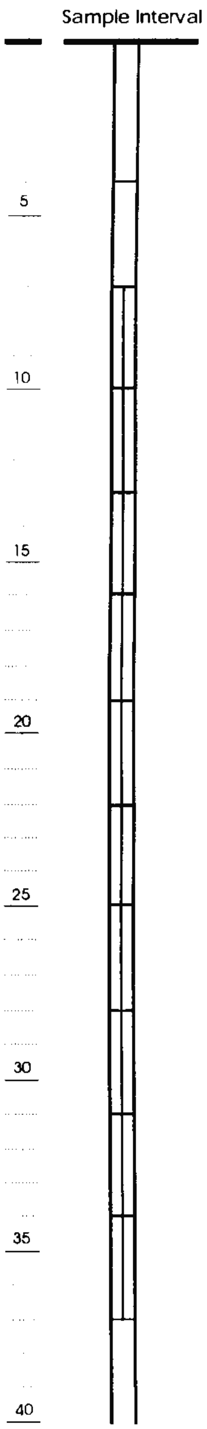
CLAYEY SANDY SILT (ML), yellowish brown, moist, soft, non plastic, very fine sand.
CLAYEY GRAVELLY SILT (ML), strong brown, moist, medium stiff, non plastic, fine subangular gravel.
CLAYEY SANDY GRAVEL (GC), grayish brown, moist, medium dense, very well graded angular gravel, clasts to 4 centimeters, some cobbles.

SAND (SW), grayish brown, very moist, medium dense, well graded, angular and subangular, medium to coarse, trace silt and gravel.

CLAYEY SANDY SILT (ML), yellowish brown, moist, medium stiff, non plastic, very fine sand.

GRAVELLY SAND (SW), grayish brown, very moist to wet, loose, well graded, subrounded, gravel clasts to 1 centimeter.

SILTY SAND (SM), yellowish brown, moist, medium dense, poorly graded, very fine sand.



EXPLANATION

- ▤ Clay
- ▤ Silt
- ☐ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 31, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 593-BH-02 *(page 1 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
				No sampling.		
45					45	
50					50	
55					55	
60					60	
65					65	
70					70	
75					75	
80					80	

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 31, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▥ Silt
▨ Sand
▩ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

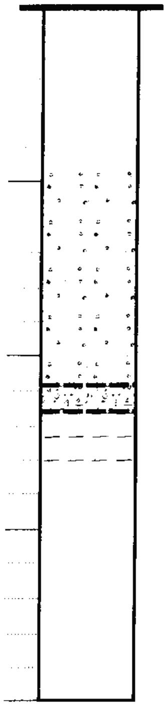
LFR
LEVINE•FRICKE

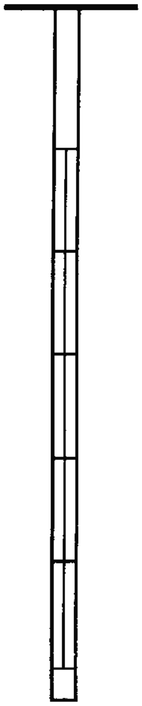
LITHOLOGY FOR 593-BH-02 *(page 2 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
85				SANDY GRAVEL (GW), grayish brown, moist, dense, angular and subangular, well graded gravel to 5 centimeters, clasts to less than 1.5 centimeters, coarse sand, some silt.	85	
90				Very moist, clasts to less than 3 centimeters. SILTY SANDY GRAVEL (GM), grayish brown, wet, medium dense, well graded subangular, clasts to 1.5 centimeters, 20% silt. SILTY SAND (SM), yellowish brown, very moist, dense, poorly graded fine sand.	90	
	▼ ATD					
95					95	
100				BOTTOM OF BORING AT 100 FEET.	100	
105					105	
110					110	
115					115	
120					120	





Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 31, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
╌	Silt
░	Sand
▒	Gravel

PID -Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 593-BH-02 *(page 3 of 3)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 594

Rotten Robbie
15299 Los Gatos Boulevard
Los Gatos, California 95032

May 13, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Santa Clara County Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology primarily consists of gravels and sands to approximately 65 feet below ground surface (bgs). The shallowest depth to groundwater measured was approximately 53 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of two double-walled gasoline USTs (12,000-gallon and 15,000-gallon) and one 12,000-gallon double-walled diesel UST constructed of 100 % methanol compatible fiberglass reinforced plastic [FRP] with double-walled 100 % methanol compatible FRP piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection.

RESULTS

Eleven soil samples and four groundwater samples were collected from borings drilled adjacent to the Site. MtBE was detected at a concentration of 18 μg/kg in 1 of 11 soil samples, and at concentrations of 0.55 μg/l and 1.6 μg/l in 2 of 4 groundwater samples. The detection limit for MtBE for 1 soil sample was elevated (<200 μg/kg) due high concentrations of petroleum hydrocarbons detected in that sample. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 3 of 11 soil samples at concentrations ranging from 6.3 μg/kg to 110,000 μg/kg. Benzene and TPH as gasoline were detected at concentrations up to 5,700 μg/kg and 1,300 mg/kg, respectively. Petroleum hydrocarbons were detected in 1 of the 4 groundwater samples at concentrations ranging from 1.4 μg/l (benzene) to 0.08 mg/l (TPH as gasoline).

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Case closed 10/96.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes
Release date:	1/1/98
Fuel released:	Diesel
Location:	Dispenser
Quantity (gallons):	Unknown
Data available:	Yes

Comments:

File review at SCCFD: waste oil release discovered during removal of a waste oil tank (holes observed in bottom of the tank). Leak was discovered in a vapor recovery riser in 6/88 during a tank precision test (URF dated 4/30/93): no data available and no documented impact to the environment. Case closure issued by SCVWD on 10/96 for waste oil release. An unauthorized release of diesel (at the dispensers) was discovered in 1/98 (report dated 4/98) during UST replacement. No TPHg, BTEX or MtBE were detected in the soil samples collected.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1-02

Date installed:	2/11/98
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1998
Date overfill protection equipment installed:	1998
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	100% methanol compatible, underground
Leak detection:	Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1-03

Date installed:	2/11/98

Tank capacity (gallons):	12,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1998
Date overfill protection equipment installed:	1998
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	100% methanol compatible, underground
Leak detection:	Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1-10

Date installed:	2/11/98
Tank capacity (gallons):	15,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1998
Date overfill protection equipment installed:	1998
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	100% methanol compatible, underground
Leak detection:	Continuous interstitial monitoring Automatic pump shut down

Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #594
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
594-BH-01	03/11/99	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		31.0-31.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
594-BH-02	03/12/99	12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		24.5-25.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		34.5-35.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
594-BH-03	03/12/99	11.0-11.5	<5	<1	6.3	15	<5	<5	<5	<20	<20	<20	<200
		15.5-16.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		26.0-26.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		44.5-45.0	<200	1300	5700	67000	29000	110000	47000	<800	<800	<800	<8000
		49.0-49.5	18	1.9	72	48	51	140	19	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 594
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
594-BH-01	03/11/99	59.0-61.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
594-BH-01-DUP		59.0-61.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
594-BH-02	03/12/99	53.0-55.0	1.6	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
594-BH-03	03/12/99	64.0-65.0	0.55	0.08	1.4	9.9	2.9	12	6.8	<1	<1	<1	<10

Table proofed by CLC .

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/L = milligrams per liter

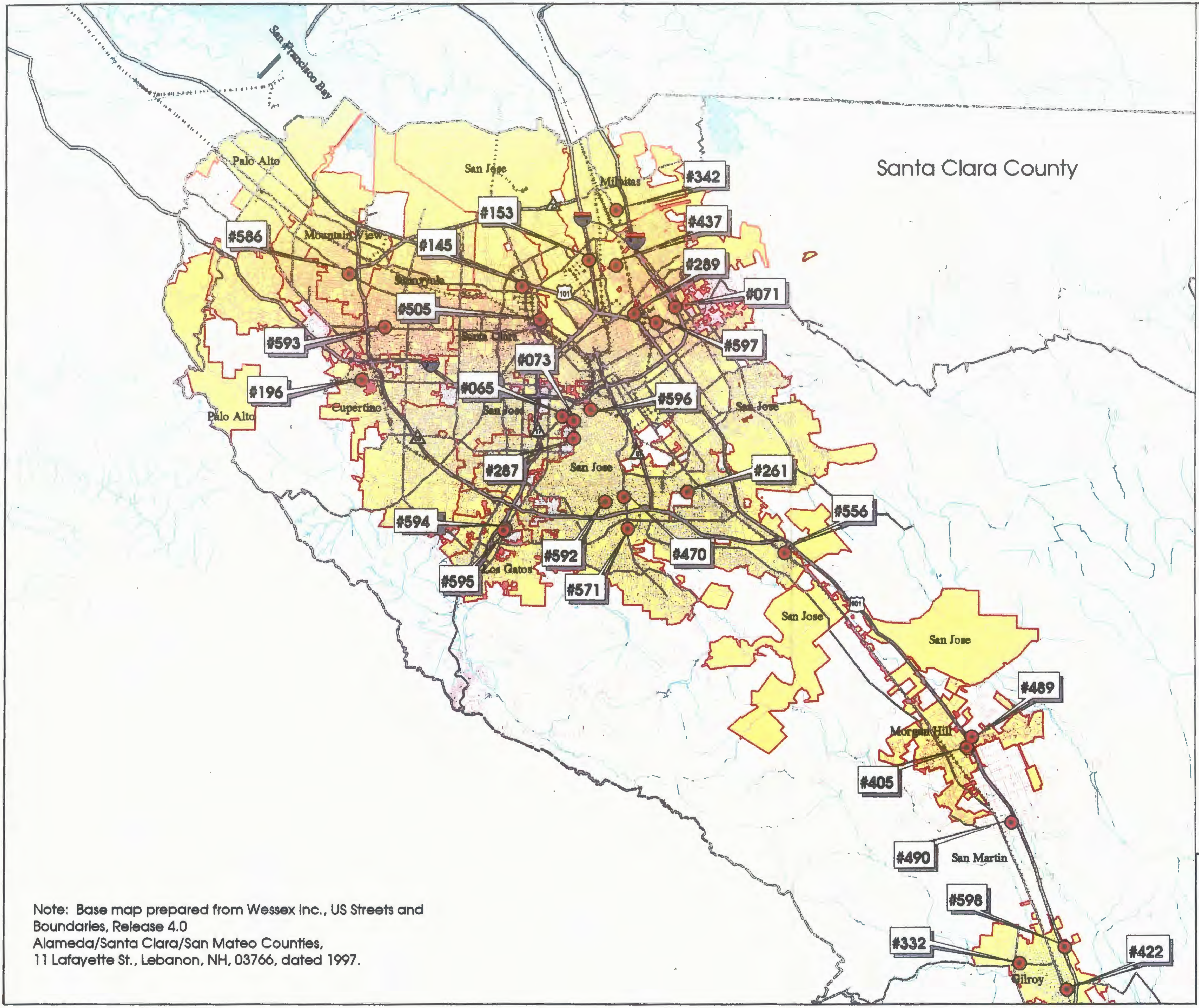
TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

●	Site Location
🟨	City within Santa Clara County
	Santa Clara County Boundary
	Rivers, Creeks, and Streams
	Freeway
	Principal Arterials
	Local Streets and Roads
	Railroad Lines

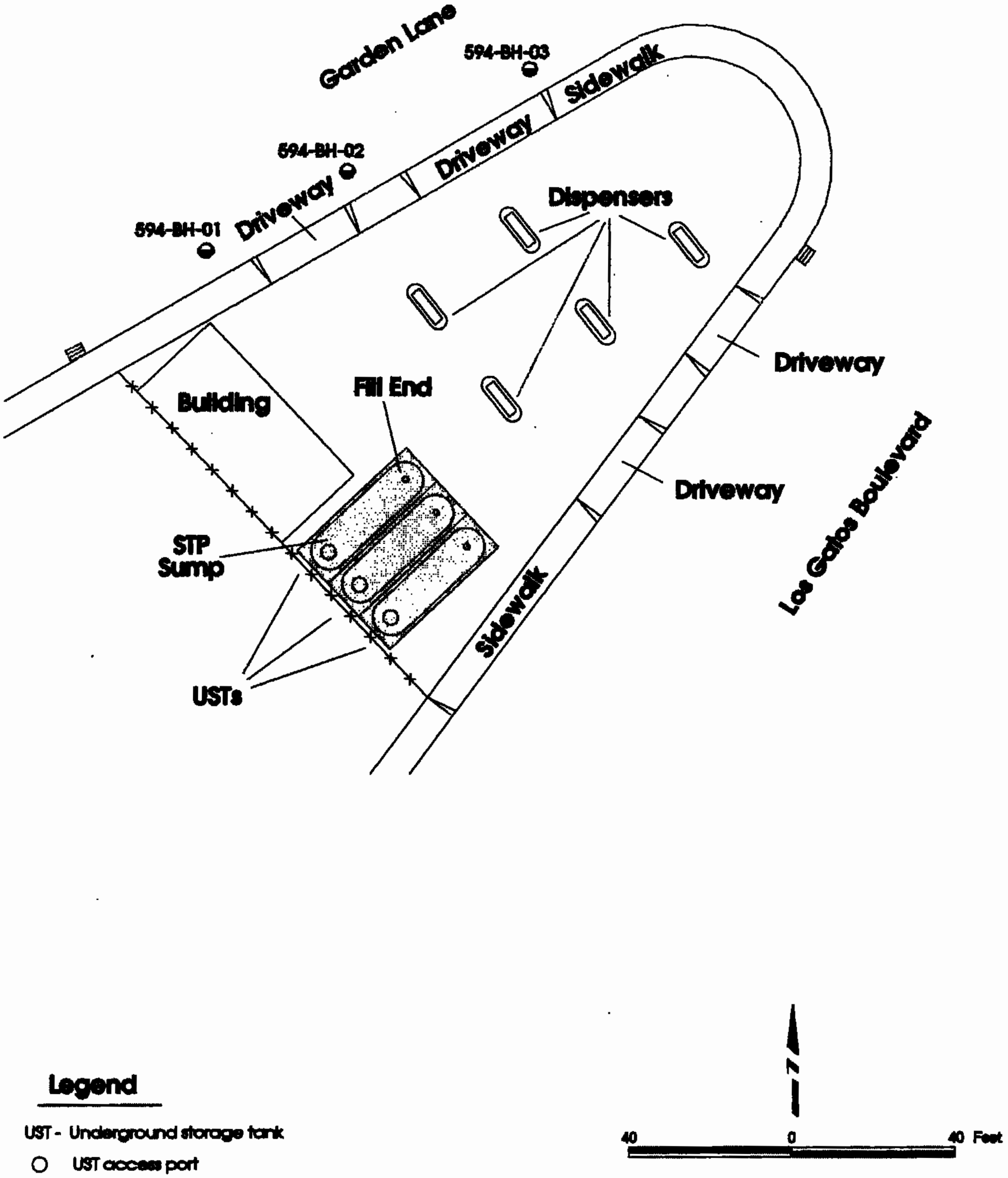
3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

UST - Underground storage tank

○ UST access port

STP - Submersible turbine pump

☐ Concrete slab

▤ Storm Drain Catch Basin

◓ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

Site #594

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2

594-BH-03

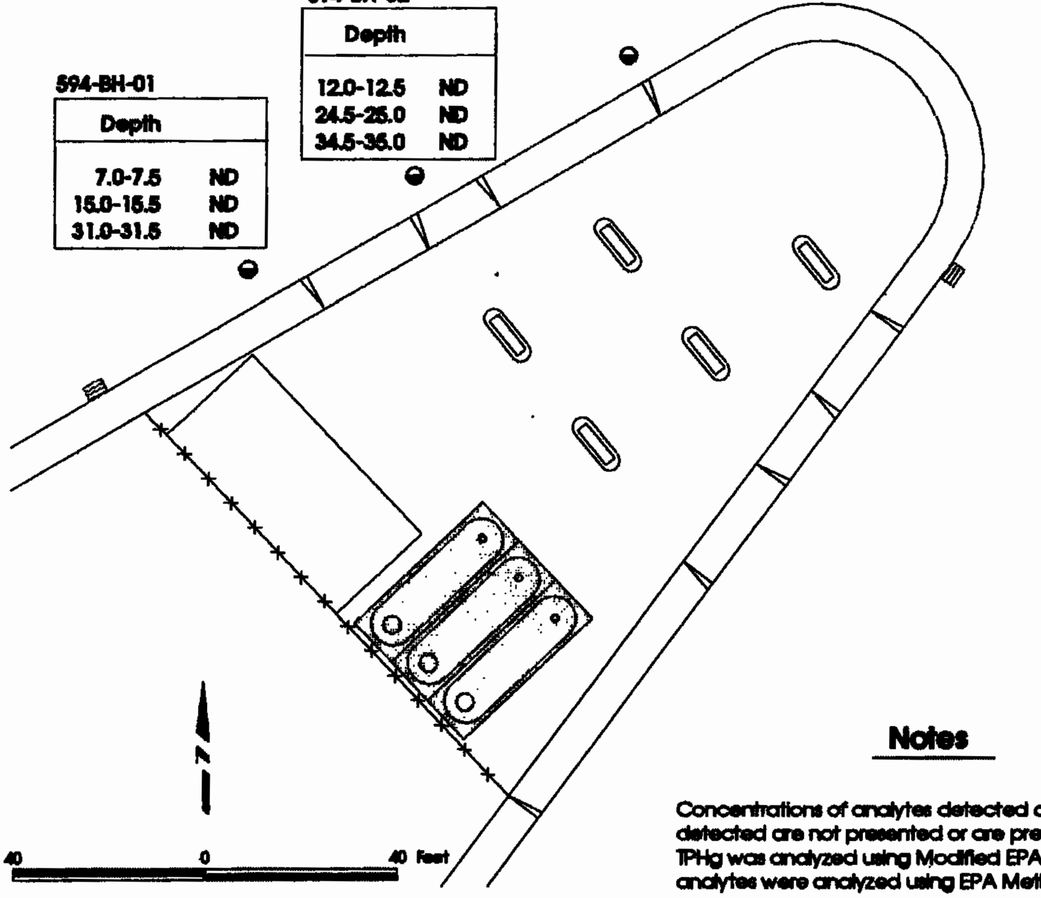
Depth	MTBE	TPHg	B	T	E	m/p-X	o-X
11.0-11.5	ND	ND	6.3	15	ND	ND	ND
15.5-16.0	ND	ND	ND	ND	ND	ND	ND
26.0-26.5	ND	ND	ND	ND	ND	ND	ND
44.5-45.0*	ND	1300	5700	67000	29000	110000	47000
49.0-49.5	18	1.9	72	48	51	140	19

594-BH-02

Depth	
12.0-12.5	ND
24.5-25.0	ND
34.5-35.0	ND

594-BH-01

Depth	
7.0-7.5	ND
15.0-15.5	ND
31.0-31.5	ND



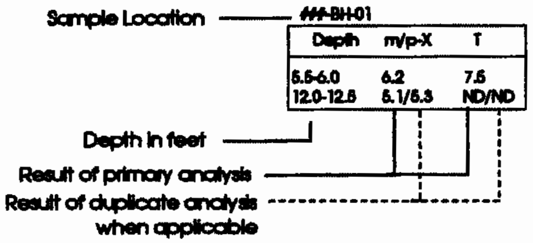
Legend

● Soil and groundwater sampling location

UST - Underground Storage Tank

○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

* = Indicates Elevated RL

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-Isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #594

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3

594-BH-03

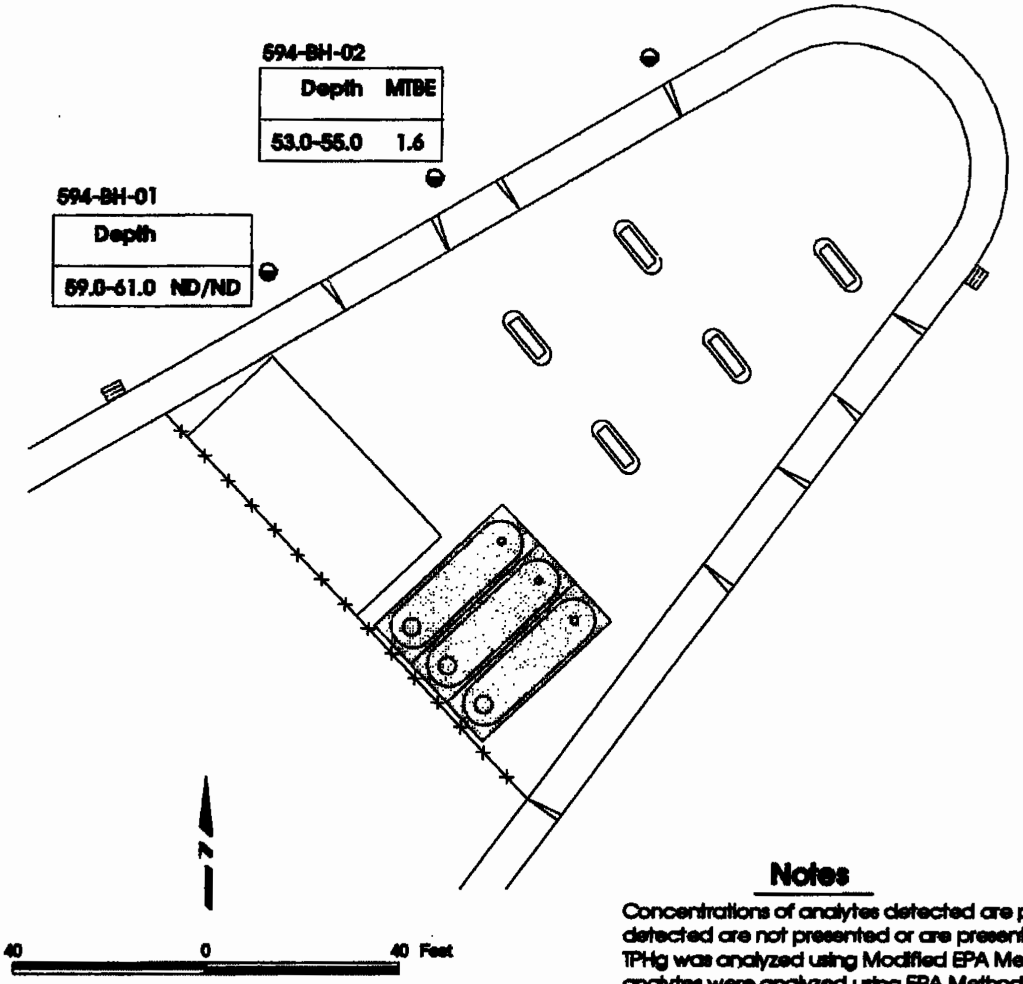
Depth	MTBE	TPHg	B	T	E	m/p-X	o-X
64.0-65.0	0.55	0.08	1.4	9.9	2.9	12	6.8

594-BH-02

Depth	MTBE
53.0-55.0	1.6

594-BH-01

Depth	
59.0-61.0	ND/ND



Legend

● Soil and groundwater sampling location

UST - Underground storage tank

○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

▨ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

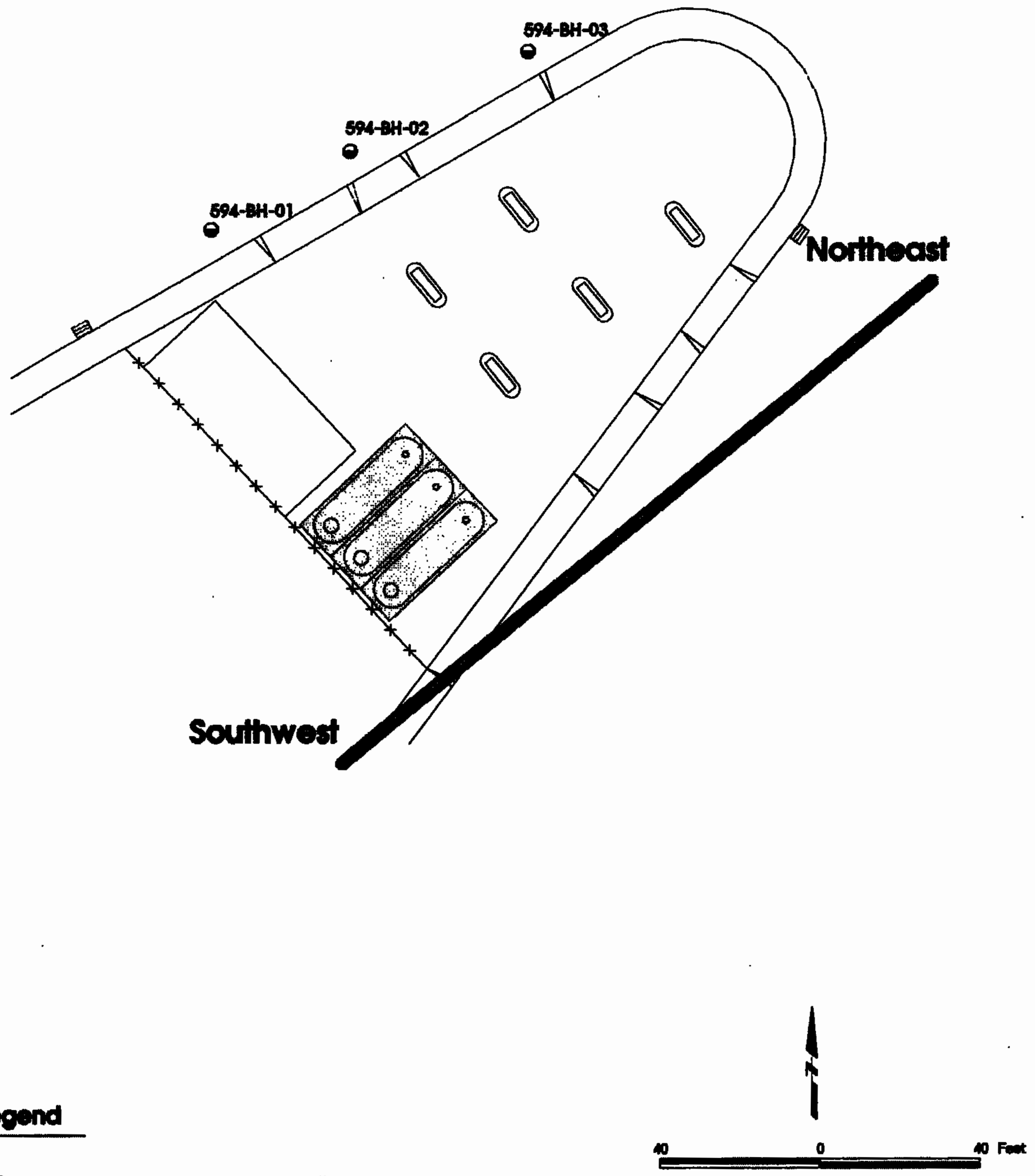
Site #594

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

⊖ Soil and groundwater sampling location

UST - Underground storage tank

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

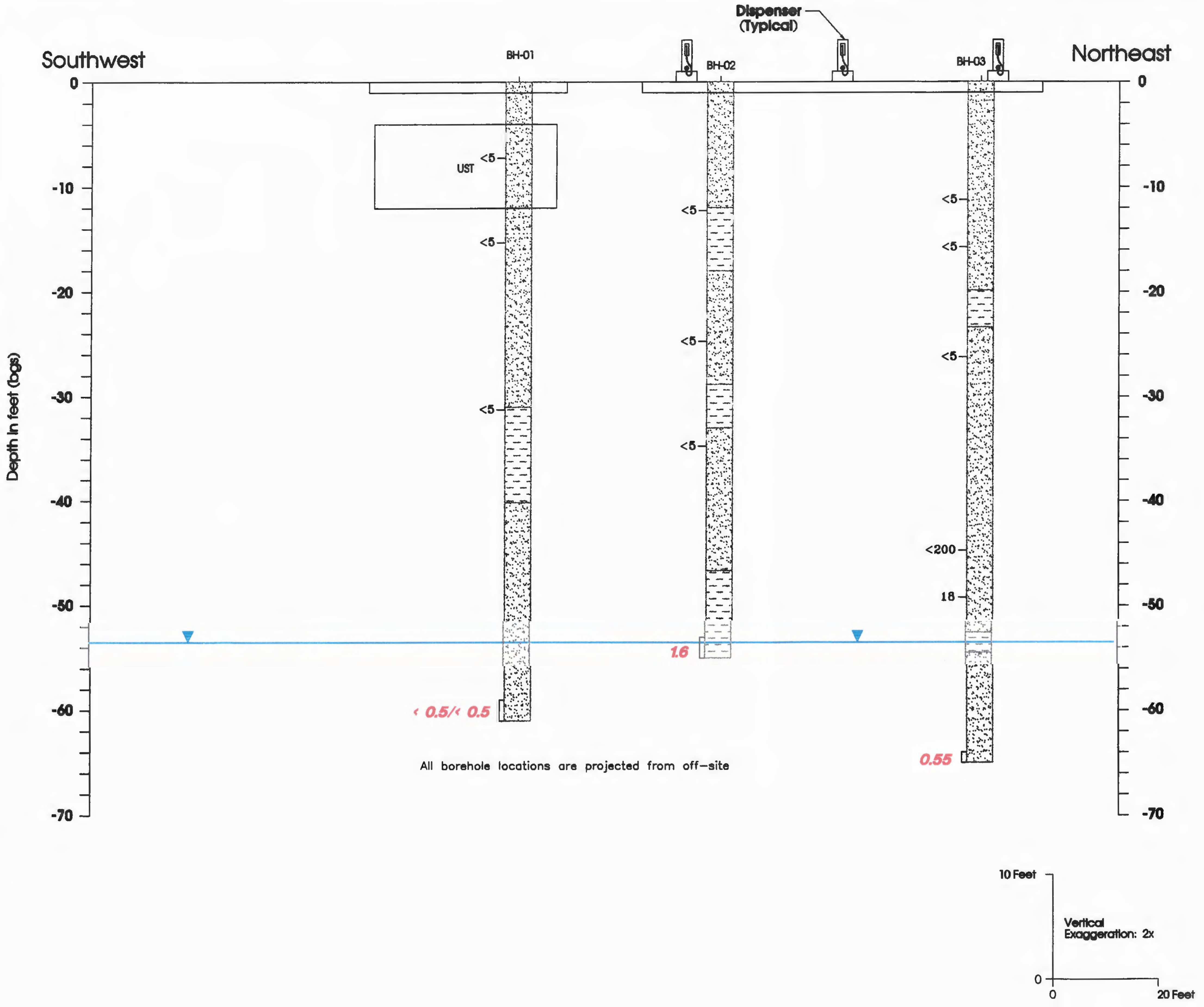
Site #594

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5



Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
▽	Shallowest measured depth to groundwater
< 0.5/< 0.5	Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST	Underground storage tank
BH-01	Borehole location

Borehole

- Soil sample location
- Groundwater sample location

▤	Clays, Silts
▨	Sands, Gravels

NOTE: All borehole locations are projected from off-site

Site #594

Vertical Profile Schematic

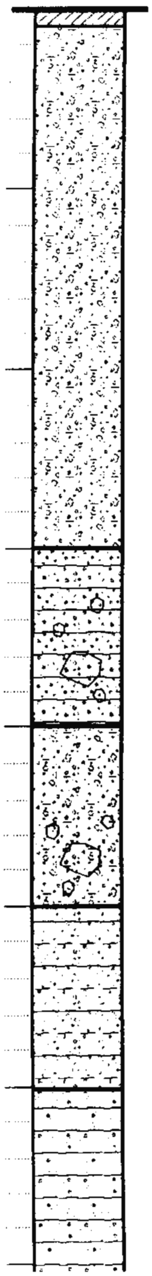
Santa Clara Valley Water District

LFR LEVINE•FRICKE

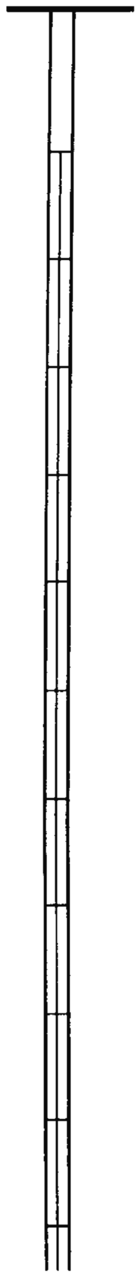
Figure 6

J:\ENGCAD\6730\CM\#594.DWG 04/30/99 x–sec.PCP

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			SILTY SANDY GRAVEL (GM), yellowish brown, slightly moist, medium dense, well graded, clasts to 5 centimeters, heterogenous, weathered, fine sand.
5			
		0.0	
10			Moist, some clay.
		0.0	
15			SANDY CLAYEY GRAVEL (GC), yellowish brown, very moist, medium dense, well graded, clasts to 2 centimeters, subround and subangular.
		0.0	
			COBBLE, dry sandstone in highly weathered, heterogenous matrix.
20			SILTY SANDY GRAVEL (GM), yellowish brown, moist to very moist, medium dense, some clay, well graded, subangular, clasts to cobble size, pockets of pale brown to tan, fine sand, heterogenous.
		0.0	
			COBBLE.
25			SILTY CLAYEY GRAVELLY SAND (SC), yellowish brown to grayish brown, slight to very moist, heterogenous, well graded, weathered.
		0.0	
30			CLAYEY GRAVELLY SAND (SC), grayish brown, very moist, loose, well graded, predominantly coarse grained, subangular gravel to 4 centimeters.
		0.0	
			SANDY CLAY (CL), yellowish brown, moist, soft, well graded sand.
35			



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 11, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

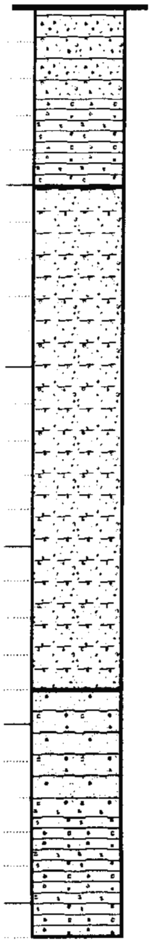
▤ Clay
▤ Silt
▒ Sand
▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



0.0

CLAYEY SANDY GRAVEL (GC)/SANDY GRAVELLY CLAY (CL), yellowish brown, moist to very moist, medium dense to soft, low plasticity, heterogenous, weathered angular clasts to 3 centimeters.

40

0.0

SILTY GRAVELLY SAND (SM), pale yellowish brown, moist to slightly moist, dense, well graded, subangular, very fine sand to coarse gravel, heterogenous composition.

45

NS

50

0.0

0.0

55

GRAVELLY CLAYEY SAND (SC) to GRAVELLY SANDY CLAY (CL), yellowish brown, moist, medium dense, well graded, subangular gravel to 2 centimeters, weathered heterogenous mixture.

Wet.

60

BOTTOM OF BORING AT 61 FEET.

65

70

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 11, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

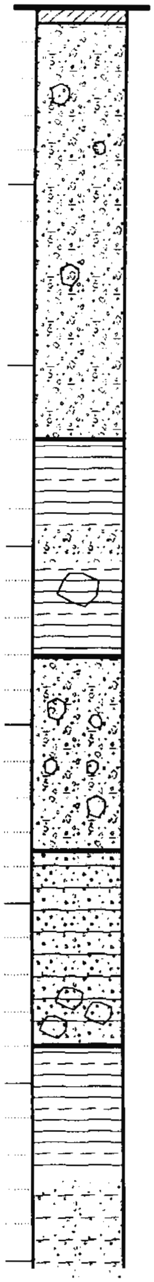
EXPLANATION

☰	Clay
☷	Silt
▨	Sand
▩	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



cont....

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT.	
5				5
			SILTY SANDY GRAVEL (GM), grayish brown, moist, loose, well graded, subangular, fractured, clasts to cobble size.	
		0.0		
10		NS		10
			SILTY SANDY GRAVEL (GM), yellowish brown, moist, loose, well graded, angular, heterogenous, clasts to cobble size, some clay, some highly weathered dark brown sandstone.	
		0.0		
			SILTY CLAY (CL), yellowish brown and pale brownish gray, slightly moist, very stiff, slight plasticity.	
15			Sand and gravel pockets.	15
			Weathered cobbles, very dark gray to black and reddish brown.	
		0.0		
			SILTY GRAVEL (GM) with SAND, light yellowish brown, slightly moist, dense, well graded, angular, clasts to cobble size, fractured sandstone.	
20				20
		NS		
			CLAYEY SANDY GRAVEL (GC), light yellowish brown, very moist to wet, dense, well graded, angular, heterogenous, clasts to cobble size.	
25		0.0		25
		NS		
			Refusal at 27.5 feet.	
			Cobbles? SILTY SANDY CLAY (CL), mottled yellowish to grayish brown and pale olive to tan, slightly moist, very stiff, low plasticity, some gravel.	
30				30
			SILTY GRAVELLY SAND (SM), olive-brown, very moist, medium dense, well graded, subrounded, predominantly coarse grained, gravel clasts to 2 centimeters.	
35		0.0		35

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 11, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤	Clay
☰	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

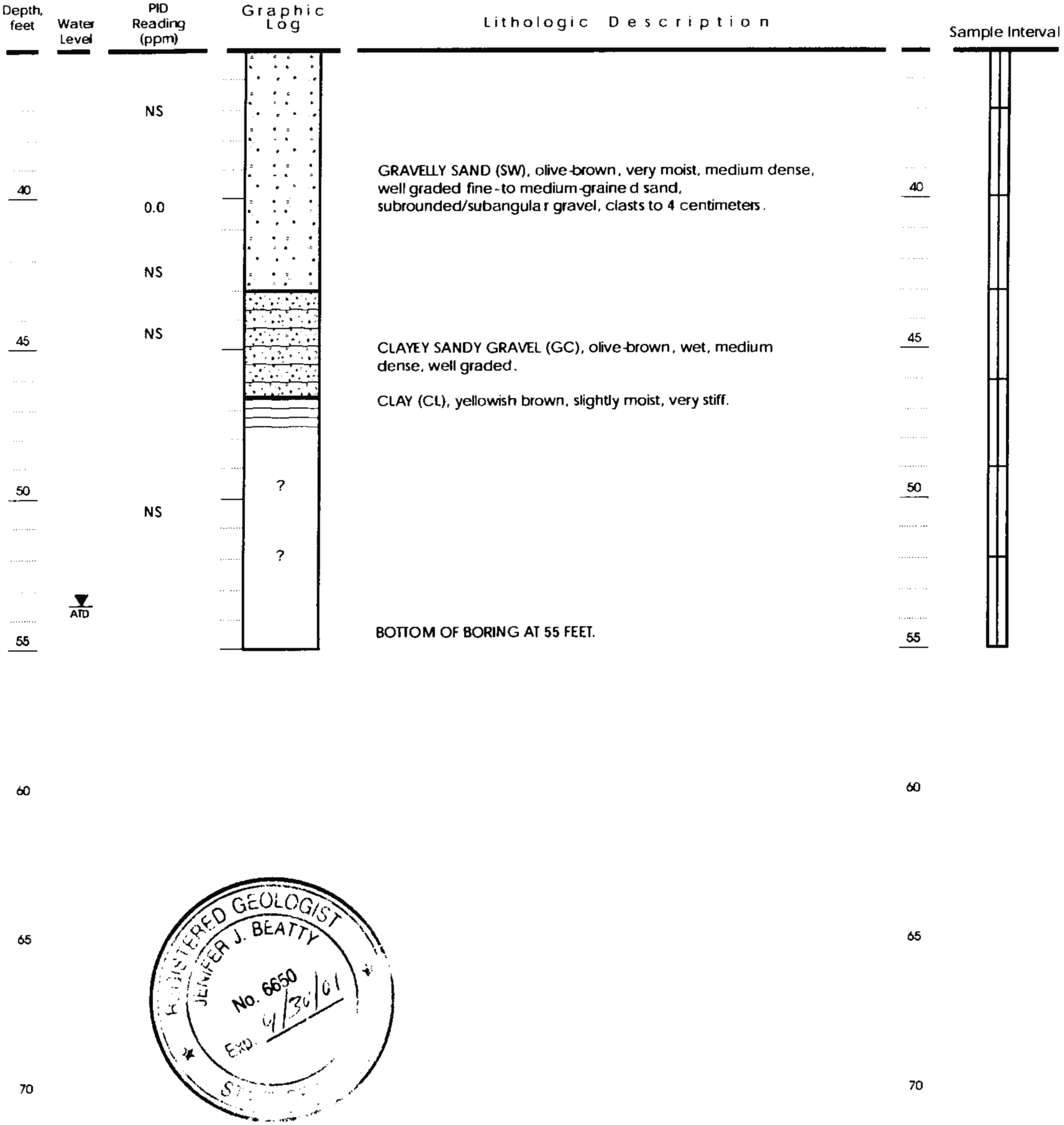
▼ Water level at time of drilling

LFR
LEVINE·FRICKE

LITHOLOGY FOR 594-BH-02 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



GRAVELLY SAND (SW), olive-brown, very moist, medium dense, well graded fine-to medium-grained sand, subrounded/subangular gravel, clasts to 4 centimeters.

CLAYEY SANDY GRAVEL (GC), olive-brown, wet, medium dense, well graded.

CLAY (CL), yellowish brown, slightly moist, very stiff.

BOTTOM OF BORING AT 55 FEET.

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 12, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
┅	Silt
⁘	Sand
⁙	Gravel

PID - Photoionization Detector

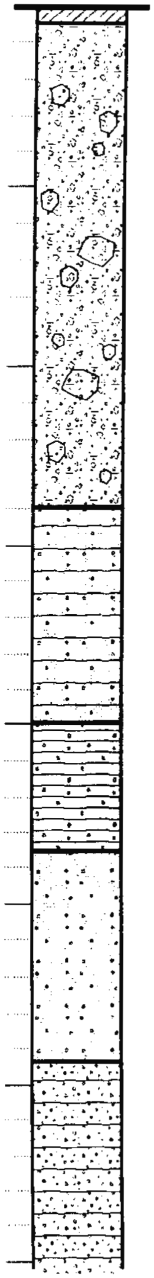
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 594-BH-02 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
5		0.0	SANDY GRAVEL (GW), brown, slightly moist, loose, well graded, angular, clasts to 5 centimeters, abundant fine sand, weathered friable sandstone clasts, some silt.
		NS	
10		0.0	Light brown, increased cobbles.
		NS	
15		0.0	Clayey with depth. CLAYEY GRAVELLY SAND (SC), olive-brown to yellowish brown, moist, medium dense, well graded, subangular, trace coarse gravel.
		NS	
20		0.0	GRAVELLY CLAY (CL), yellowish brown mottled with tan and reddish brown, slightly moist to dry, stiff, slight plasticity.
		NS	GRAVELLY SAND (SW), grayish brown, very moist, loose, some clay, well graded, subangular, predominantly coarse-grained sand and fine gravel.
25		0.0	
		NS	
30		0.0	CLAYEY SANDY GRAVEL (GC), brownish yellow, moist, medium dense, well graded, subangular to 1 centimeter, some coarse gravel.
35		0.0	

Sample Interval

cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 11, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ┅ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

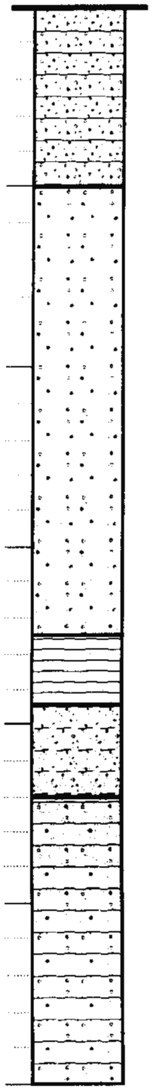
J. BEATTY
No. 6650
Exp 4/30/01

LFR
LEVINE•FRICKE

LITHOLOGY FOR 594-BH-03 *(page 1 of 2)*

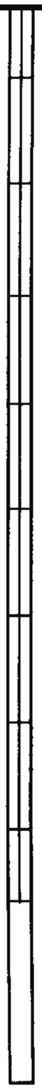
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
40		NS	
45		500-1000	GRAVELLY SAND (SW), brown, moist, medium dense, subangular.
		NS	
		100	
50		10	GRAVELLY SAND (SW), olive to olive-green, moist, medium dense, well graded, predominantly coarse, subangular sand, gravel clasts to 2 centimeters, some clay. Oil and gasoline odor.
		NS	
		35	SANDY CLAY (CL), yellowish brown, moist, stiff, medium plasticity, coarse sand.
55		10	SILTY GRAVELLY SAND (SM), yellowish brown, moist, medium dense, medium grained, some clay.
		NS	
60		0.0	CLAYEY GRAVELLY SAND (SC), yellowish brown, very moist, medium dense, coarse grained, subangular.
65			BOTTOM OF BORING AT 65 FEET.
70			

Sample Interval



JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 12, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
☷	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 595

Unocal #4563
15380 Los Gatos Boulevard
Los Gatos, California 95032

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Santa Clara County Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology primarily consists of gravels with thin layers of clay to approximately 65 feet below ground surface (bgs). Groundwater was not encountered at this site.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of two 12,000-gallon single-walled USTs constructed of fiberglass, with fiberglass reinforced plastic exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes mechanical line leak detection, line tightness testing, and continuous interstitial monitoring for piping leak detection, and automatic tank gauging for UST leak detection.

RESULTS

MtBE was detected in 1 of 15 soil-gas samples collected from the site at a concentration of 310 μg/l. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 11 of the 15 soil-gas samples at concentrations ranging from 0.0092 μg/l (ethylbenzene) to 59 μg/l (meta/para-xylene). TPH as gasoline was detected in 2 of the 15 soil-gas samples at concentrations of 115 μg/l and 16,400 μg/l. No MtBE or petroleum hydrocarbons were detected in the 3 soil samples collected from one boring drilled onsite. No groundwater samples were collected.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Waste oil release reported 3/91. Case closed 5/92.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes, TOSCO granted access, but dealer requested LFR to stop work during soil and groundwater sampling activities.
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	Yes
Release date:	1/1/91
Fuel released:	Waste oil
Location:	Not noted
Quantity (gallons):	Unknown
Data available:	Not noted

Comments:

1/91 correspondence indicated that soil in the waste oil tank pit was contaminated and that the soil was removed by overexcavation. Site closure letter from the SCVWD issued on 5/92.
In 5/94, there was a bid request to do the following: remove existing dispensers, drive slabs,

island, and WO tank, and install 4 Gilbarco dispensers, new drive slabs, island, repipe, and new tank top. A Kaprealian Engineering Inc. report, dated 8/94, indicates that soil results for samples collected from beneath product piping trenches and dispenser islands did not contain petroleum hydrocarbons; the samples from WO tank pit had B (0.012 ppm), T (0.014 ppm), E (ND), and X (0.0087 ppm). No further sampling was recommended.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Unknown
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Unknown
Under island containment present?	Yes
Under island containment monitoring:	Float switch
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Manifolded
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 4 years
Years of operation as fueling facility:	Approximately 39 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Float monitors on 3 of 4 under island dispensers were too long, rendering them ineffective. Performed functional test on liquid detectors in turbine sumps - passed.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes

Station inventory records available?	No
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	Not available
Spill log comments:	Not applicable
Personnel training:	Not noted
Comments:	

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To the west (toward Los Gatos Boulevard)
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	Yes
Name of surface water:	San Jose 7 mi res.
Type of surface water:	Pond
Comments:	

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 4563-RU-1

Date installed:	1/1/82
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 4563-SU-1

Date installed:	1/1/82
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #595
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
595-SG-01	03/19/99	8	<5	<100	<1	<1	<1	<1	<1	
		13	<5	115	<1	<1	<1	1	<1	
		18	<5	<100	<1	1.6	<1	1.1	<1	
595-SG-02	03/19/99	8	<5	<100	<1	1.9	<1	2.2	<1	
		13	<5	<100	<1	<1	<1	<1	<1	
		18	<5	<100	<1	1.1	<1	<1	<1	
595-SG-02-DUP		18	<5	<100	<1	<1	<1	<1	<1	
595-SG-02-SPL		18	<0.011	NA	0.012	0.049	0.0092 J	0.042	0.013	(a)
595-SG-03	03/19/99	8	<5	<100	<1	1.2	<1	<1	<1	
		13	<5	<100	<1	1.1	<1	<1	<1	
		18	<5	<100	<1	1.1	<1	1.6	<1	
595-SG-04	03/19/99	8	<5	<100	<1	2.2	<1	2.4	<1	
		13	<5	<100	<1	1.4	<1	<1	<1	
		18	<5	<100	<1	<1	<1	<1	<1	
	03/24/99	23	310	16400	35	24	<10	59	15	

Table proofed by CLC.

Notes:
(a) Other analytes detected: Ethanol (0.0057 ug/L) and Tertiary butyl alcohol (TBA) (0.0043 ug/L)
All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2

Summary of Chemical Analysis Results for Soil Samples - Site #595

Santa Clara Valley Water District

	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
595-BH-01	03/29/99	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		24.0-24.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		33.0-33.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

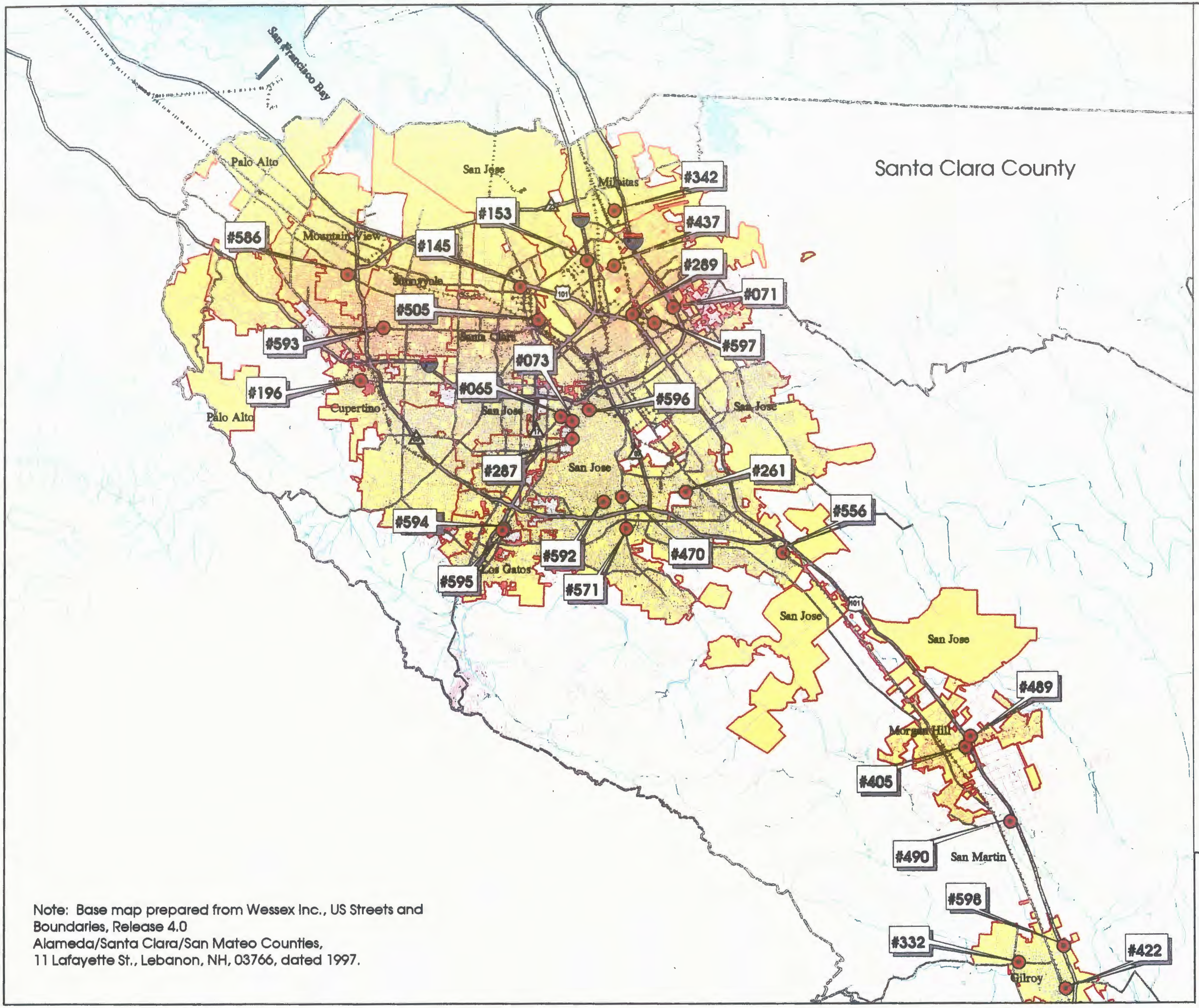
TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown



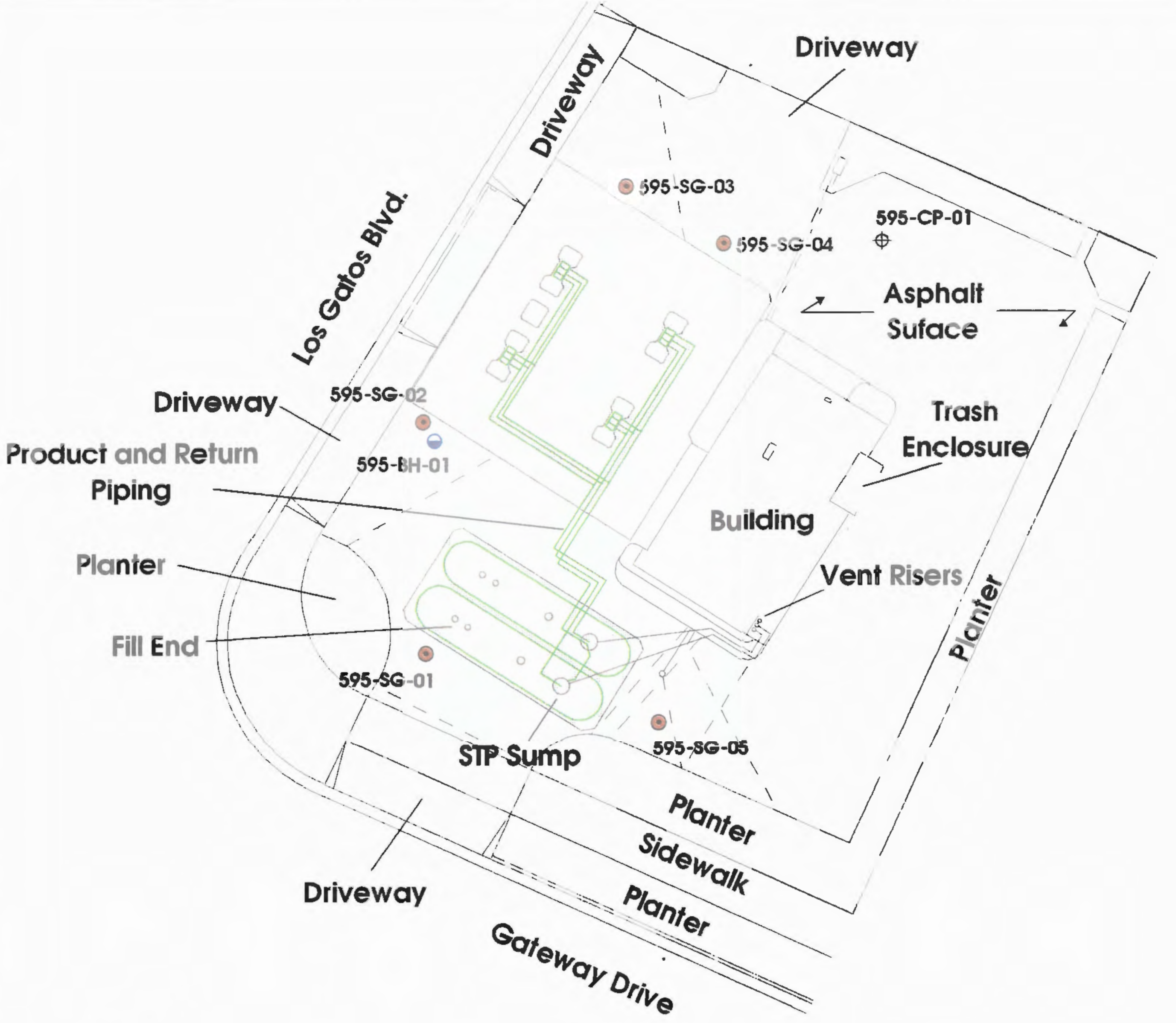
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

▭ Gasoline underground storage tank, product and return piping, and dispenser. Piping locations shown are from base map cited below, however, based on LFR field inspection, locations likely differ.

○ UST access port

▭ Concrete slab

– – – Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from General Arrangement, S-S. No. 4563, Los Gatos Blvd and Gateway, Los Gatos, CA, dated 1/13/95.

N

30 0 30 Feet

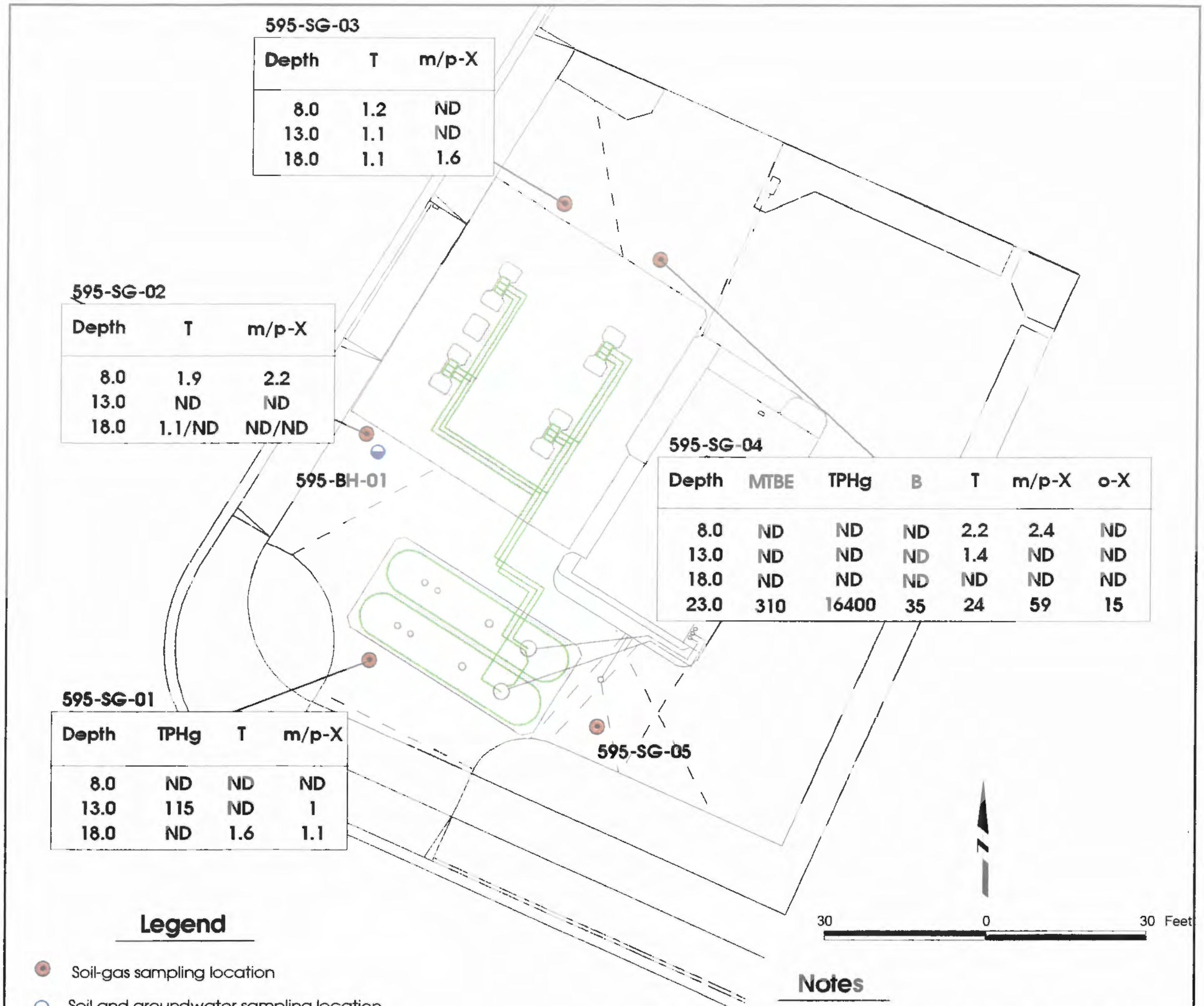
Site #595

Site Plan

Santa Clara Valley Water District

LFR
LEVINE • FRICKE

Figure 2



595-SG-03

Depth	T	m/p-X
8.0	1.2	ND
13.0	1.1	ND
18.0	1.1	1.6

595-SG-02

Depth	T	m/p-X
8.0	1.9	2.2
13.0	ND	ND
18.0	1.1/ND	ND/ND

595-SG-04

Depth	MTBE	TPHg	B	T	m/p-X	o-X
8.0	ND	ND	ND	2.2	2.4	ND
13.0	ND	ND	ND	1.4	ND	ND
18.0	ND	ND	ND	ND	ND	ND
23.0	310	16400	35	24	59	15

595-SG-01

Depth	TPHg	T	m/p-X
8.0	ND	ND	ND
13.0	115	ND	1
18.0	ND	1.6	1.1

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-SG-01

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations shown are from base map cited below, however, based on LFR field inspection, locations likely differ.

○ UST access port

▭ Concrete slab

– – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

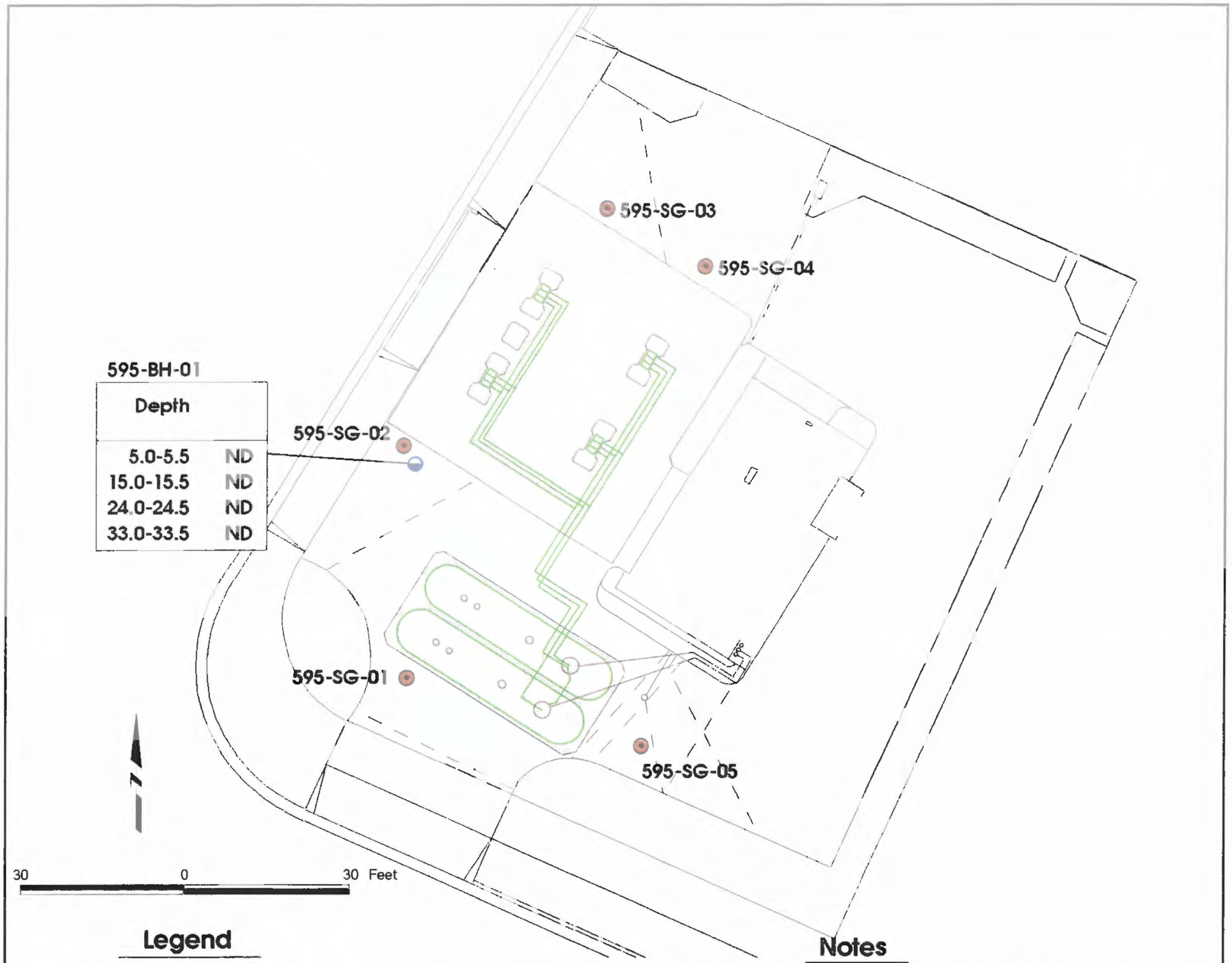
Site #595

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



595-BH-01

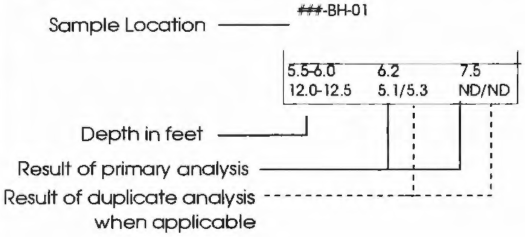
Depth	
5.0-5.5	ND
15.0-15.5	ND
24.0-24.5	ND
33.0-33.5	ND

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations shown are from base map cited below, however, based on LFR field inspection, locations likely differ.

○ UST access port

▭ Concrete slab

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

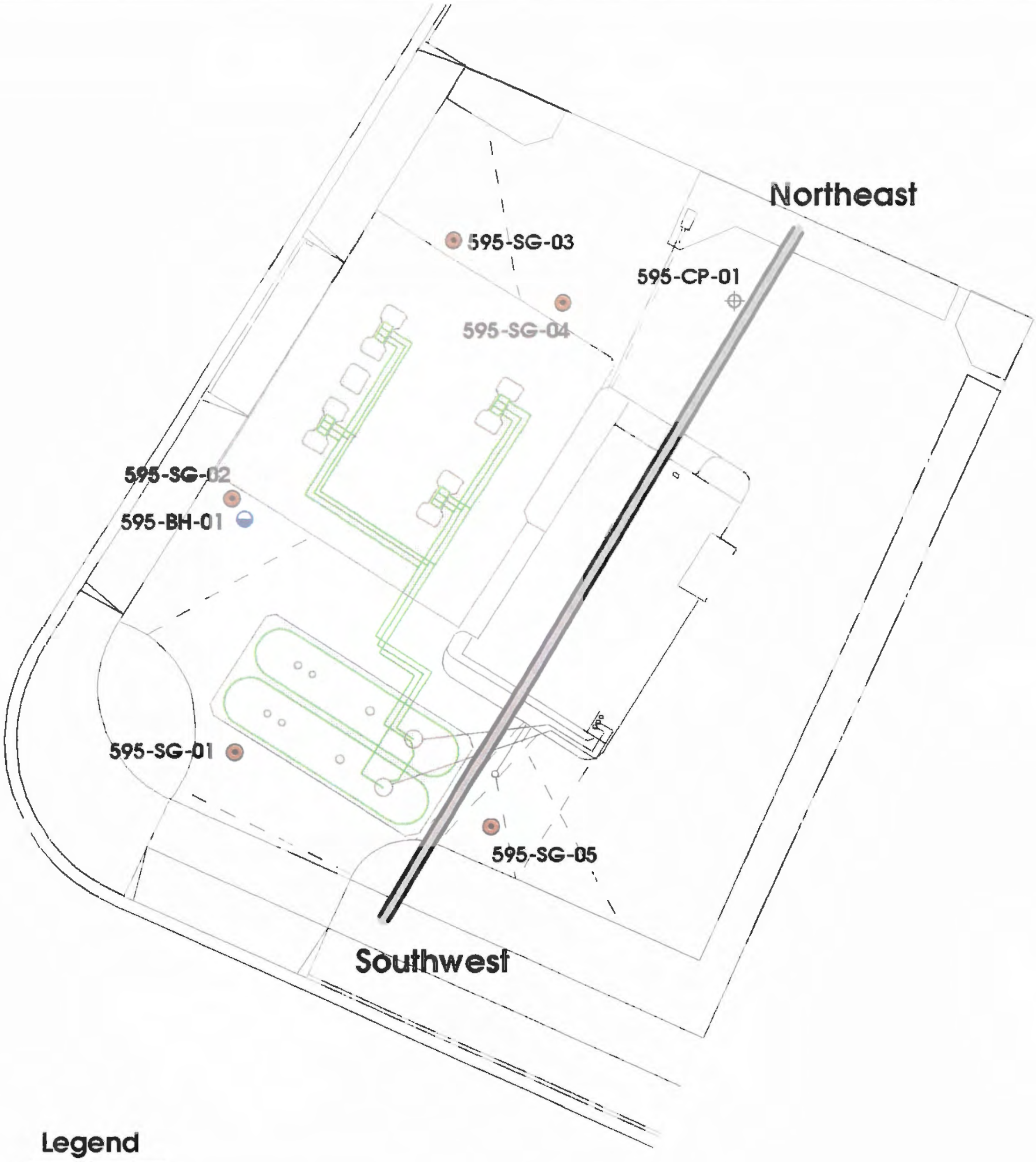
Site #595

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

🟩	Gasoline underground storage tank, product and return piping, and dispenser. Piping locations shown are from base map cited below, however, based on LFR field inspection, locations likely differ.
○	UST access port
▭	Concrete slab
— — —	Underground utilities
◒	Soil and groundwater sampling location
●	Soil-gas sampling location
⊕	Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.

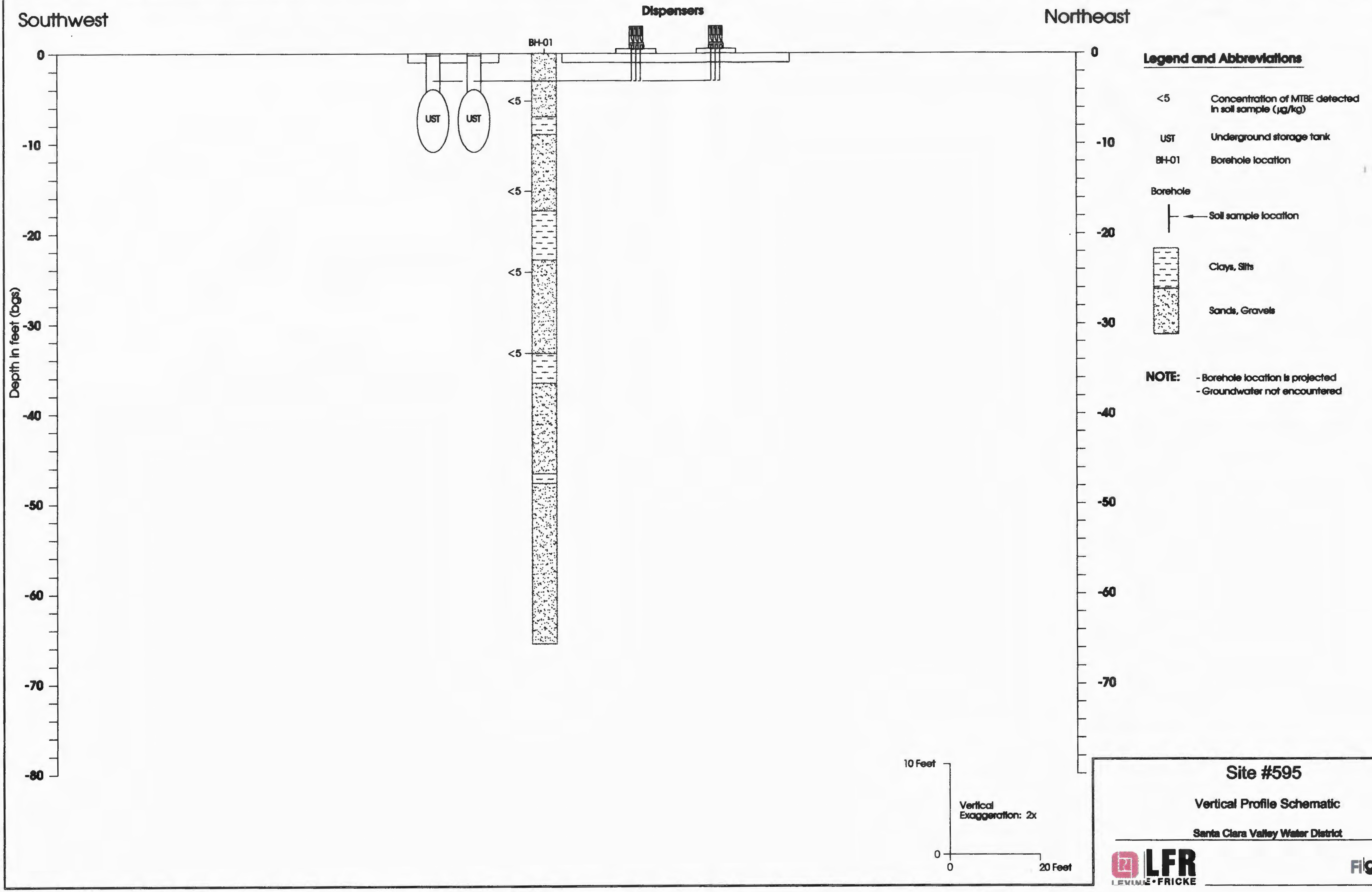
Site #595

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5



NOTE: - Borehole location is projected
- Groundwater not encountered

Site #595

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE·FRICKE

Figure 6

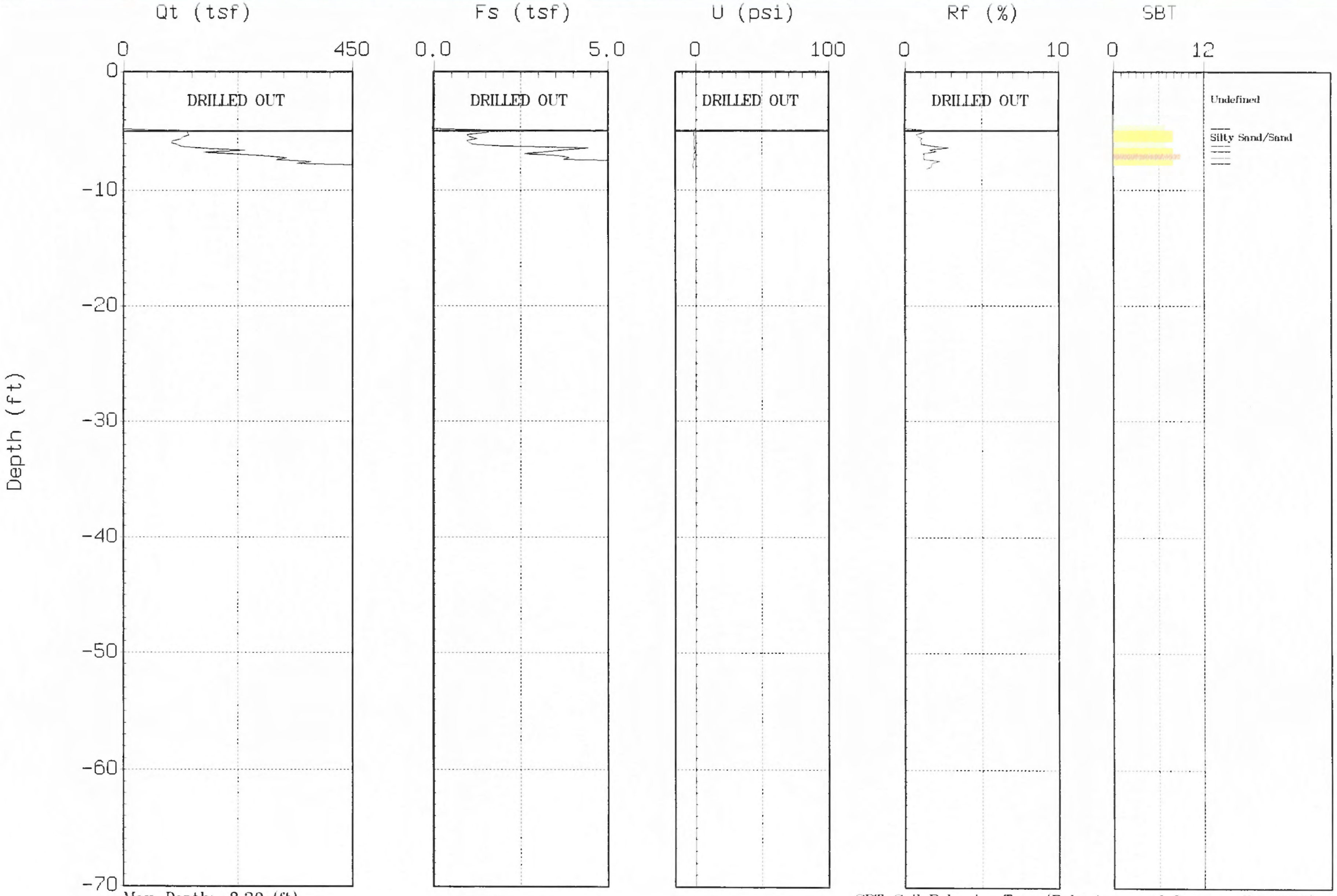
J:\ENGCAD\6730\CM#592.DWG 05/11/99 x–sec.PCP

GREGG

LFR LEVINE.FRICKE

Site: UNOCAL 595
Location : 595-CP-01

Geologist: Julie Sharp
Date : 03:12:99 15:35



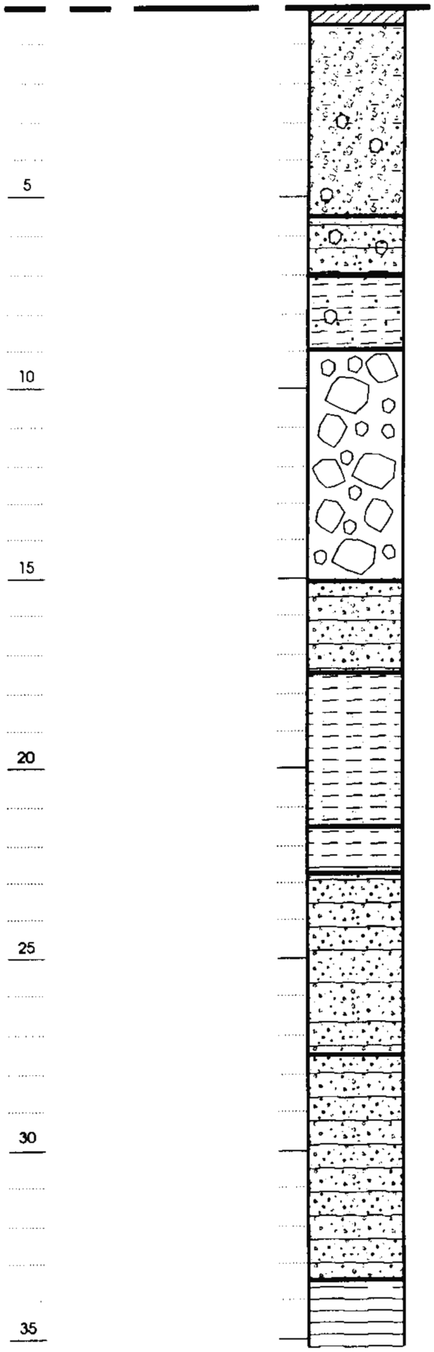
Max. Depth: 8.20 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT.

SILTY SANDY GRAVEL (GM), yellowish brown, loose, wet, well graded, angular, clasts to 2.5 centimeters.

CLAYEY SANDY GRAVEL (GC), dark yellowish brown, wet, loose, well graded, subangular, clasts to 3 centimeters, coarse sand, cobbles, sandstone.
GRAVELLY SANDY SILT (ML), dark yellowish brown, dry, stiff, very low plasticity.

COBBLES.

No recovery.

CLAYEY SANDY GRAVEL (GC), grayish yellowish brown, moist, medium dense, well graded, subrounded, clasts to 2 centimeters, medium-grained sand.

SANDY SILT (ML), yellowish brown, moist, medium stiff, non plastic, some clay.

50% sand.

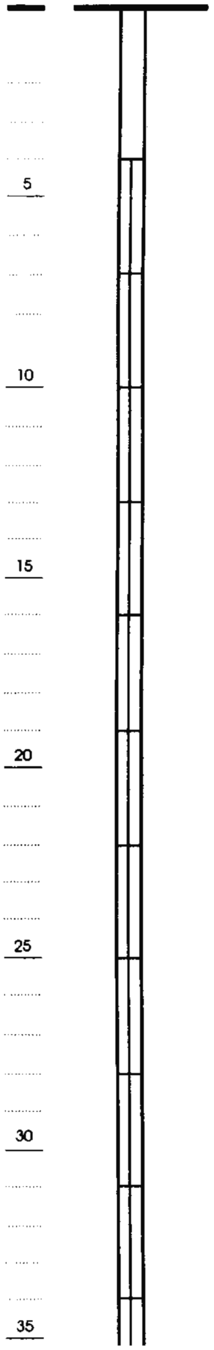
CLAYEY SILT (ML), light yellowish brown mottled with dark yellowish brown, moist, stiff, slight plasticity.
CLAYEY GRAVEL (GC), yellowish brown, slightly moist, medium dense, heterogenous, weathered, fractured cobbles.

20% coarse sand, moist.

Some clay.

CLAYEY SANDY GRAVEL (GC), yellowish brown, very moist, medium dense, well graded, subangular, clasts to 5 centimeters.

CLAY (CL), yellowish brown mottled with tan and gray, slightly moist, very stiff, low to slight plasticity.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 29, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ▤ Silt
- ░ Sand
- ▒ Gravel

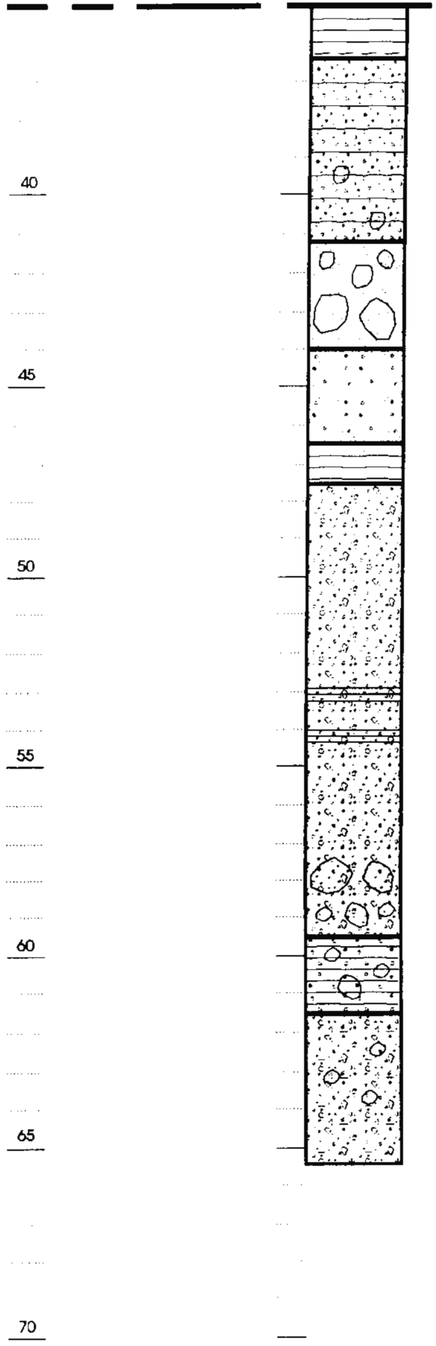
PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



SILTY CLAY (CL), yellowish brown, moist, very soft, medium to high plasticity.

CLAYEY SANDY GRAVEL (GC), grayish brown, moist to very moist, medium dense, well graded, angular, clasts to 5 centimeters, fine sand.

Heterogenous, very moist to wet.

Moist to very moist.

COBBLES, sandstone.

GRAVELLY SAND (SW), yellowish brown, very moist, medium dense, well graded, subangular grains, gravel clasts to 3 centimeters.

SANDY CLAY (CL), light grayish brown, very moist, soft, medium plasticity, medium sand.

SANDY GRAVEL (GW), light grayish brown, very moist, loose, subangular, well graded, clasts to 5 centimeters, some silt and clay.

With intervals of GRAVELLY CLAY (CL), grayish brown, moist, very stiff.

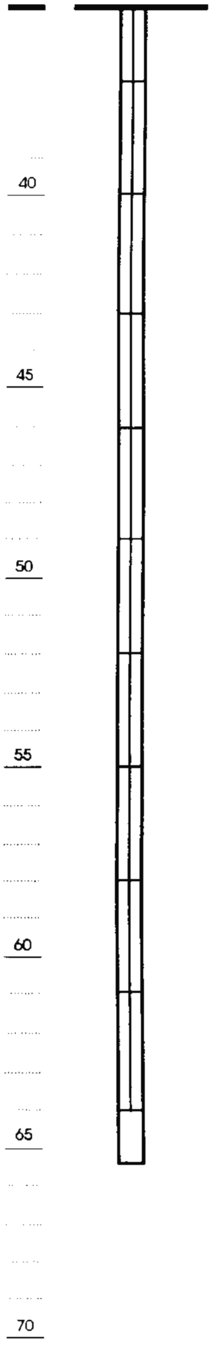
Wet.

COBBLES.

SILTY GRAVEL (GM), strong brown to dark gray, slightly moist, heterogenous.

SILTY SANDY GRAVEL (GM), yellowish brown, slighlty moist, medium dense, well graded to cobble size, angular to subangular.

BOTTOM OF BORING AT 65.5 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 29, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
┅ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR LEVINE•FRICKE

LITHOLOGY FOR 595-BH-01 *(page 2 of 2)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 596

Rotten Robbie
1061 Lincoln Avenue
San Jose, California 95125

May 7, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the San Jose Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology primarily consists of silty clays and clayey silts to approximately 26 feet below ground surface (bgs) underlain with gravels from approximately 25 feet bgs to 40 feet bgs. The shallowest depth to groundwater measured was approximately 33 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the gasoline UST system at the site consists of two double-walled USTs (12,000-gallon and 15,000-gallon), one constructed of steel clad with fiberglass reinforced plastic [FRP], the other of 100% methanol compatible material with FRP. Both tanks have FRP exterior corrosion protection, and double-walled fiberglass piping. The gasoline UST system utilizes continuous interstitial monitoring for both piping and UST leak detection as well as manual inventory reconciliation, automatic tank gauging, and annual tank testing for UST leak detection. Field observations indicate the UST system utilizes a balanced vapor recovery system.

RESULTS

MtBE was detected at a concentration of 10 μg/kg in 1 of 13 soil samples collected from borings drilled adjacent to this Site. Toluene was detected in 2 of the 13 soil samples at concentrations of 6.7 μg/kg and 11 μg/kg. No MtBE or petroleum hydrocarbons were detected in the 4 groundwater samples collected from the offsite borings.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Case closure issued in 2/91 for waste oil release. New case opened for diesel release in 6/96 at time of UST replacement (see File Review comments below). Case closure issued on 8/98 for diesel release.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	Yes
Release date:	6/1/96
Fuel released:	Diesel
Location:	Not noted
Quantity (gallons):	Unknown
Data available:	Yes

Comments:

USTs replaced in 1996, including a diesel UST. Approximately 65 mg/kg diesel detected in soil sample collected from former diesel UST excavation. No MtBE or other petroleum hydrocarbon constituents were detected.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID

Date installed:	1996
Tank capacity (gallons):	15,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Annual tank testing Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID

Date installed:	1996
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	100% methanol compatible with fiberglass reinforced plastic

Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Annual tank testing Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #596
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
596-BH-01	03/19/99	10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.0-17.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		32.0-32.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-02	03/19/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		27.0-27.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-03	03/04/99	10.5-11.0	10	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.5-21.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.5-26.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-04	03/04/99	12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	6.7	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	11	<5	<5	<5	<20	<20	<20	<200
		27.5-28.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #596
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
596-BH-01	03/19/99	10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.0-17.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		32.0-32.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-02	03/19/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		27.0-27.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-03	03/04/99	10.5-11.0	10	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.5-21.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.5-26.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
596-BH-04	03/04/99	12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	6.7	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	11	<5	<5	<5	<20	<20	<20	<200
		27.5-28.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by __CLC__.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 596
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
596-BH-01	03/19/99	32.0-37.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
596-BH-02	03/19/99	30.0-35.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
596-BH-03	03/04/99	33.0-35.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
596-BH-04	03/04/99	34.0-35.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

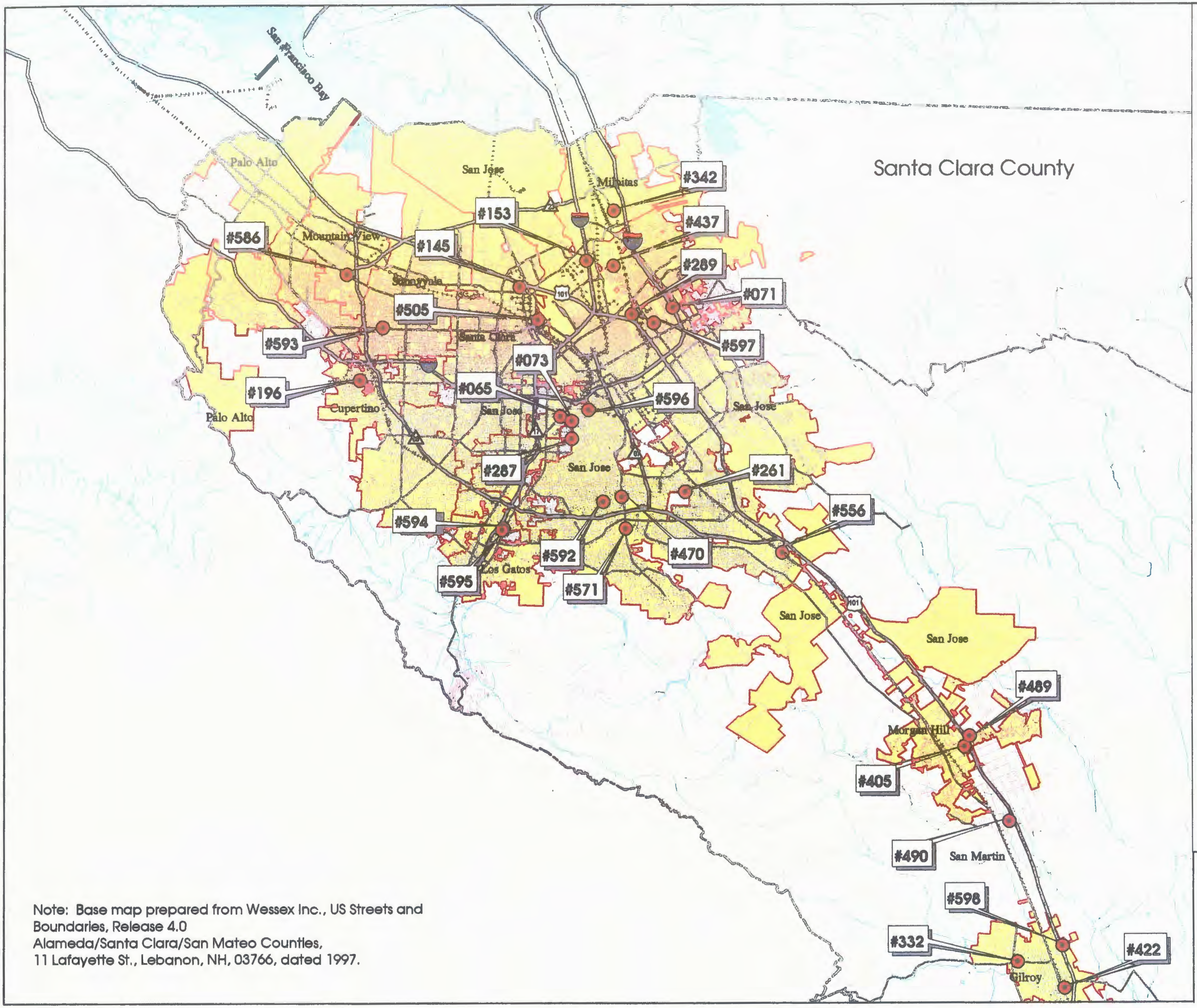
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

- ● Site Location
- 🟨 City within Santa Clara County
- Santa Clara County Boundary
- Rivers, Creeks, and Streams
- Freeway
- Principal Arterials
- Local Streets and Roads
- Railroad Lines

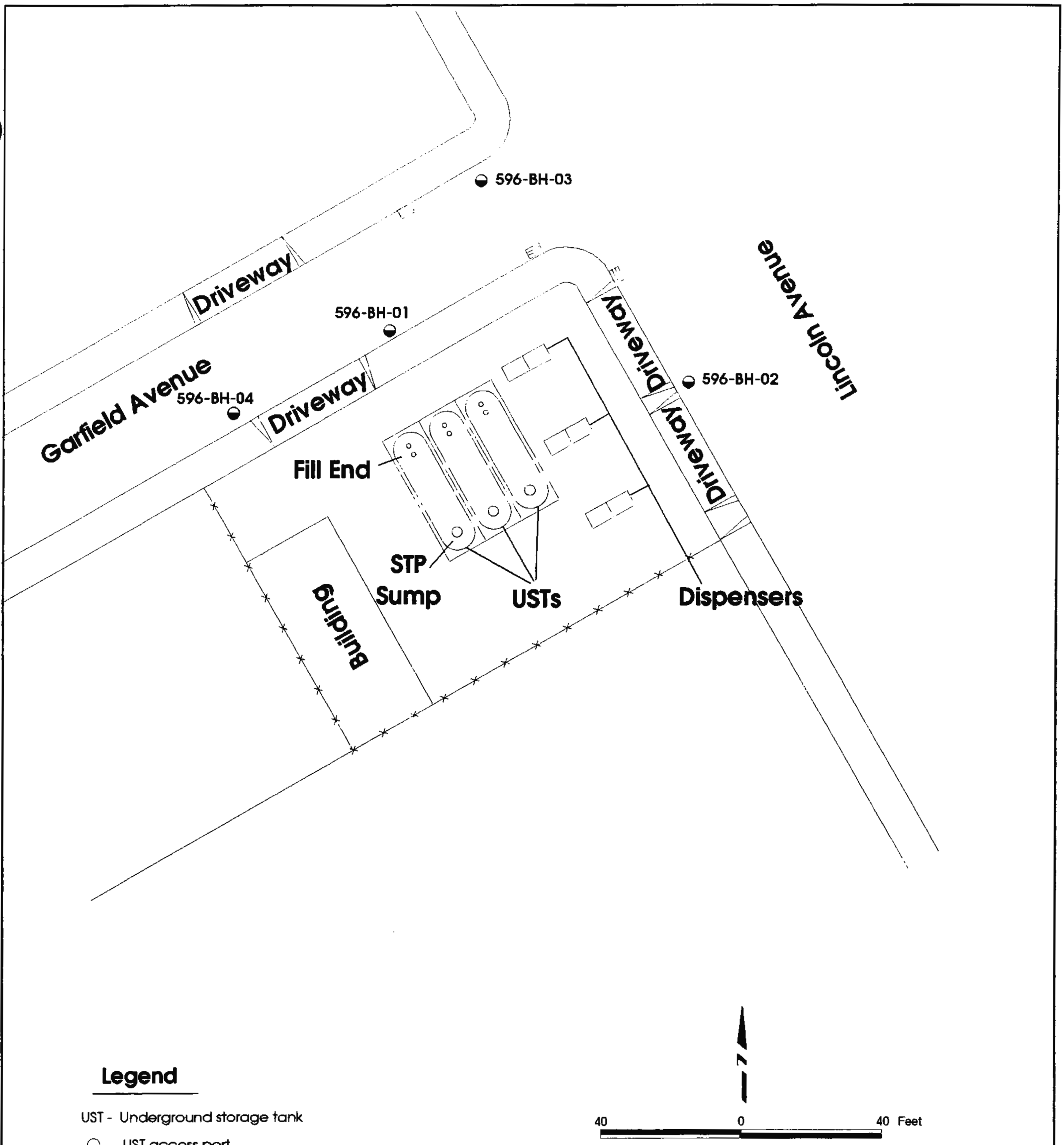
3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 1



Legend

UST - Underground storage tank

○ UST access port

STP - Submersible turbine pump

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

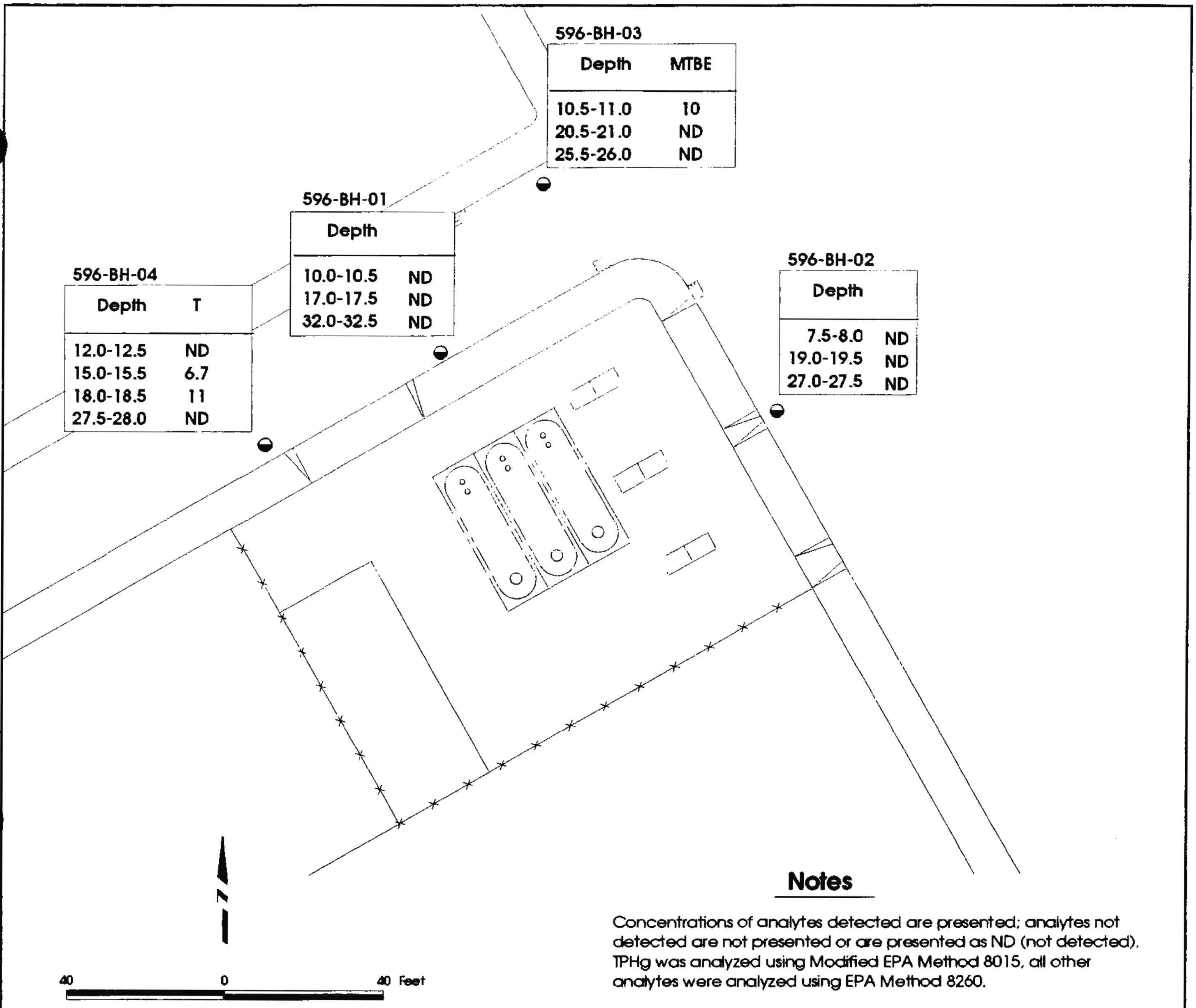
Site #596

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



596-BH-03

Depth	MTBE
10.5-11.0	10
20.5-21.0	ND
25.5-26.0	ND

596-BH-01

Depth	
10.0-10.5	ND
17.0-17.5	ND
32.0-32.5	ND

596-BH-04

Depth	T
12.0-12.5	ND
15.0-15.5	6.7
18.0-18.5	11
27.5-28.0	ND

596-BH-02

Depth	
7.5-8.0	ND
19.0-19.5	ND
27.0-27.5	ND

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

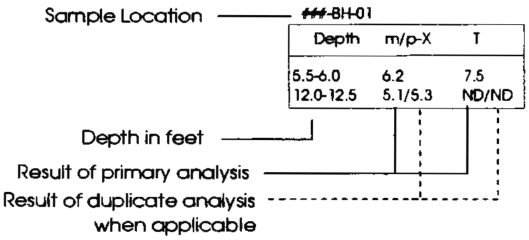
Legend

◒ Soil and groundwater sampling location

UST - Underground storage tank

○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

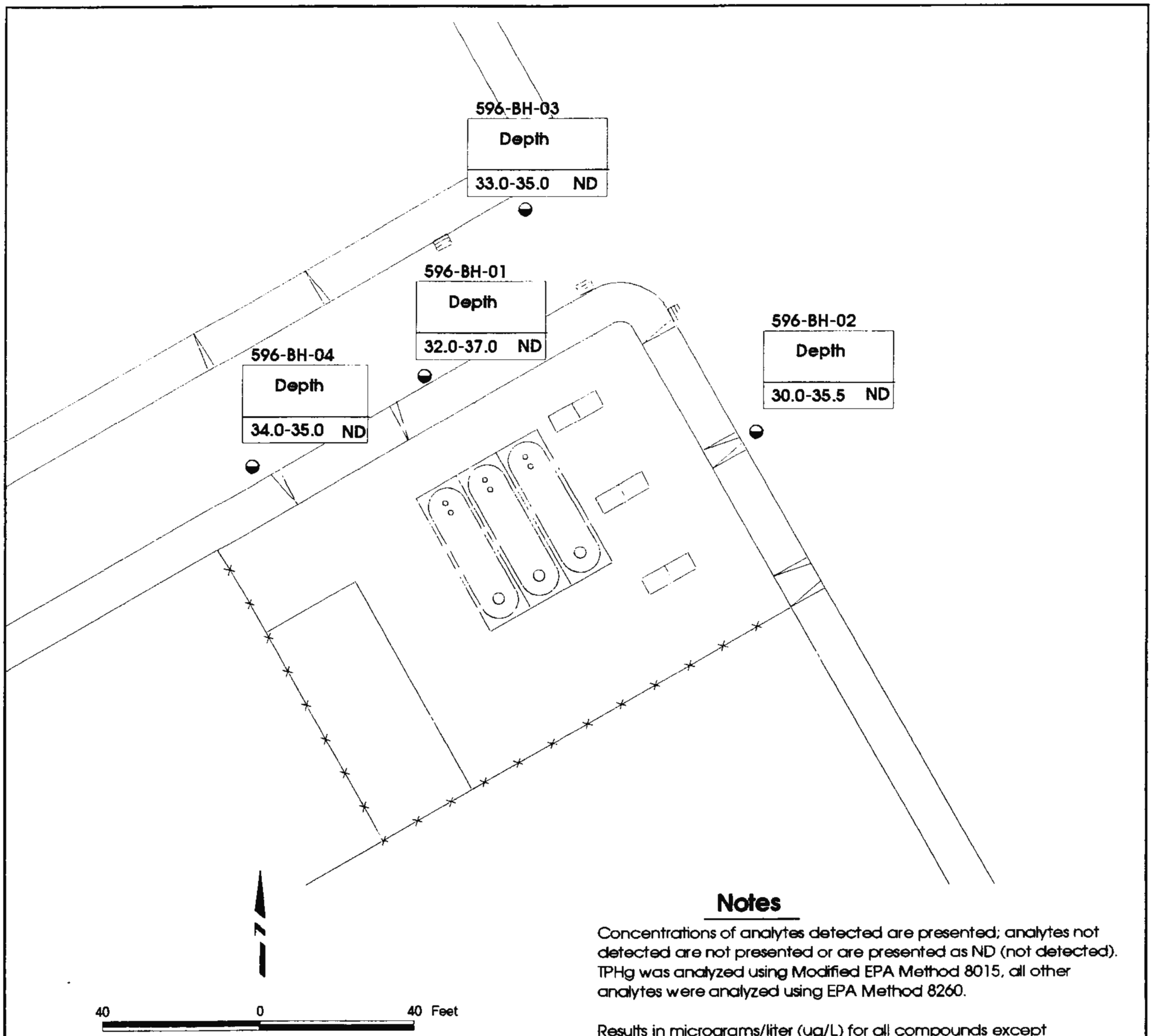
Site #596

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

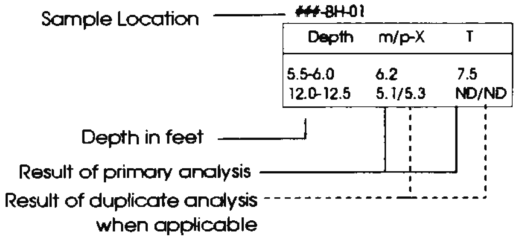
Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Legend

◒ Soil and groundwater sampling location
UST - Underground storage tank
○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

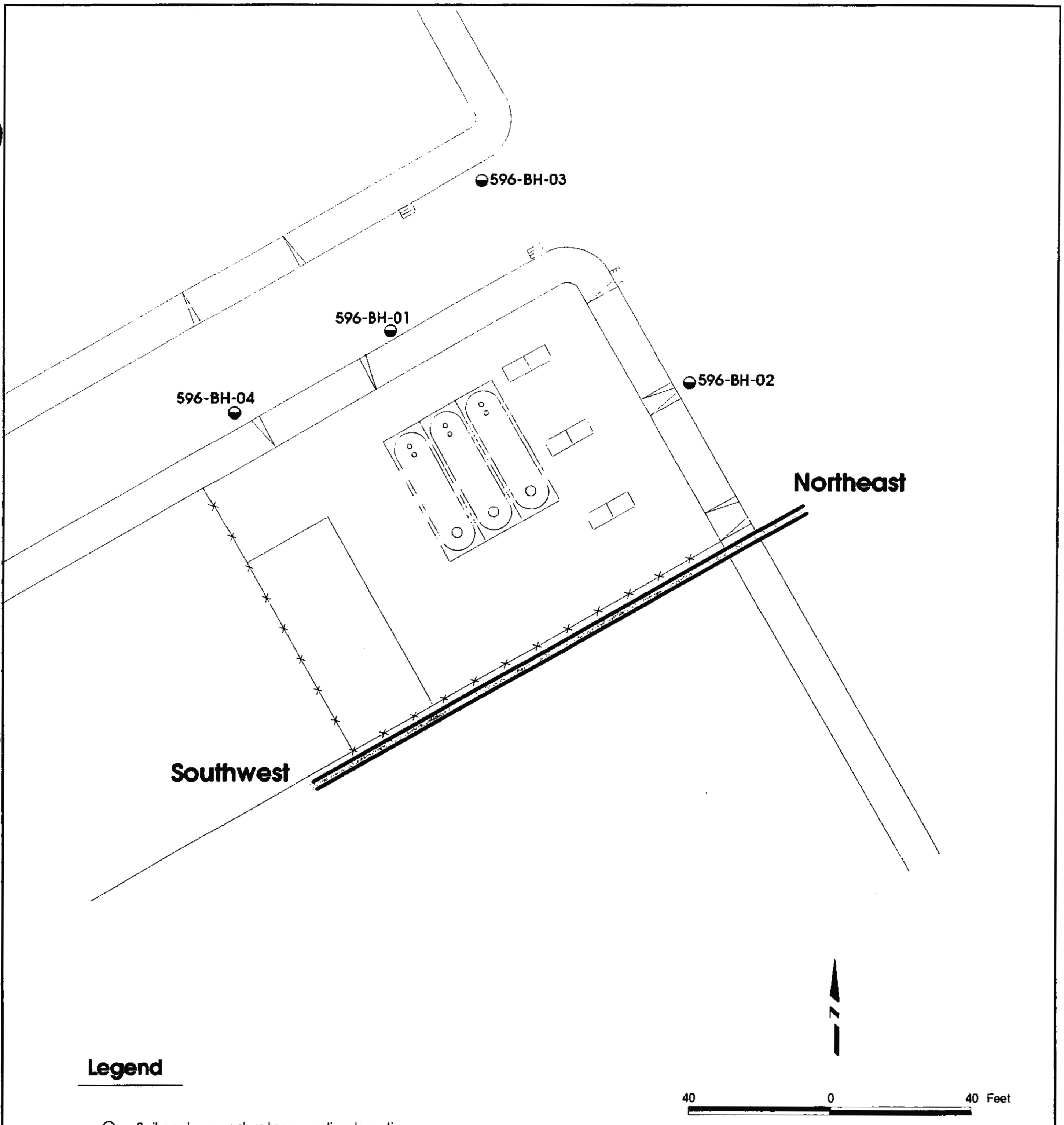
Site #596

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

◒	Soil and groundwater sampling location
UST -	Underground storage tank
○	UST access port
▤	Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

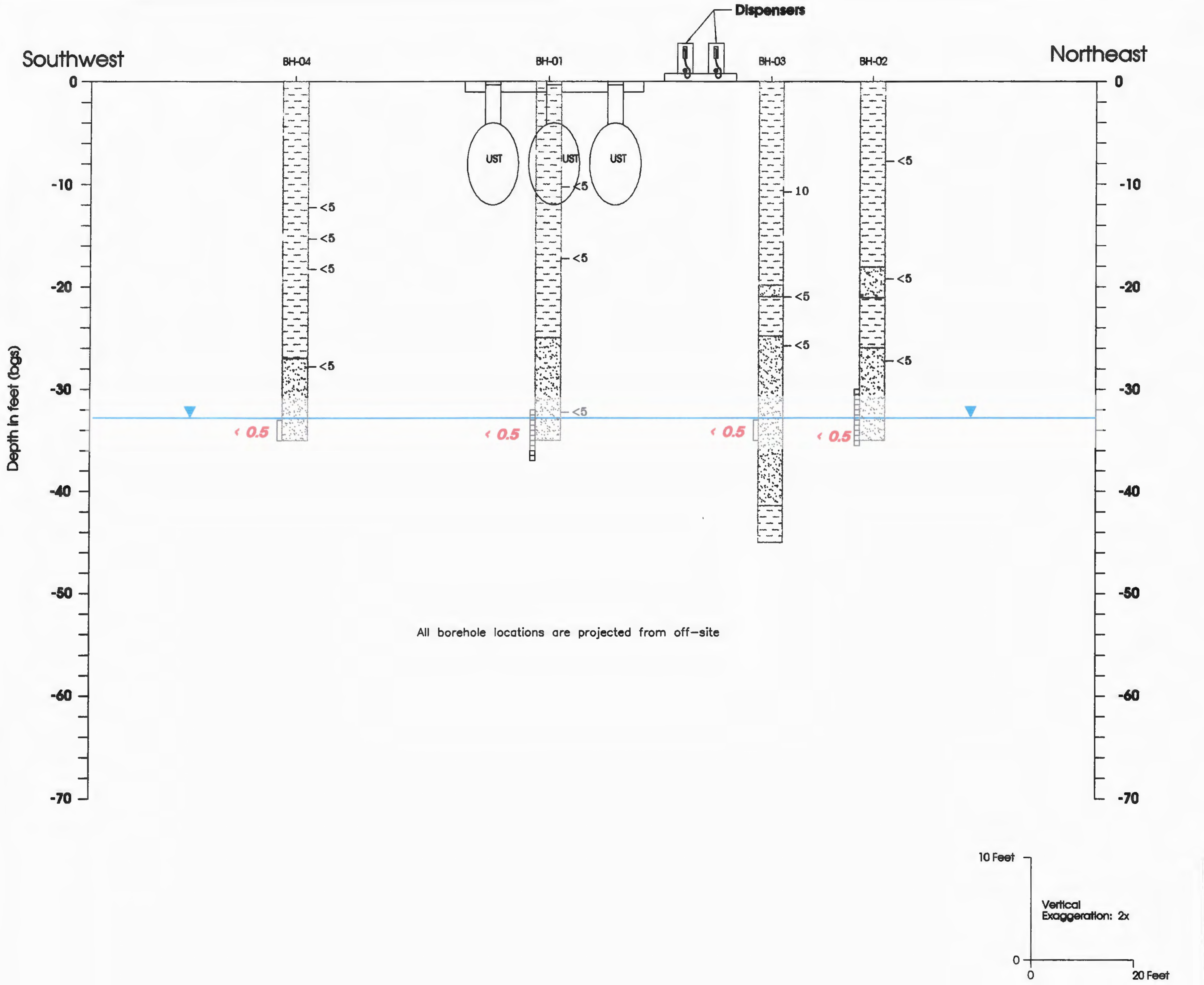
Site #596

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 5



Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
▼	Shallowest measured depth to groundwater
0.5	Concentration of MTBE detected in groundwater sample (µg/l)
UST	Underground storage tank
BH-01	Borehole location

Borehole

- Soil sample location
- Groundwater sample location
- Temporary monitoring well screen

▤	Clays, Silts
▨	Sands, Gravels

NOTE: All borehole locations are projected from off-site

J:\ENGCAD\6730\CM#596.DWG 04/30/99 x-sec.PCP

Site #596

Vertical Profile Schematic

Santa Clara Valley Water District

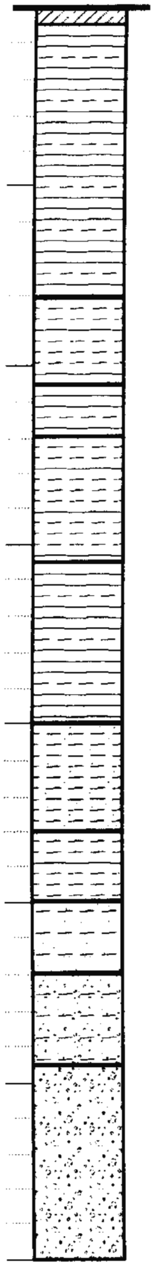
LFR LEVINE•FRICKE

Figure 6

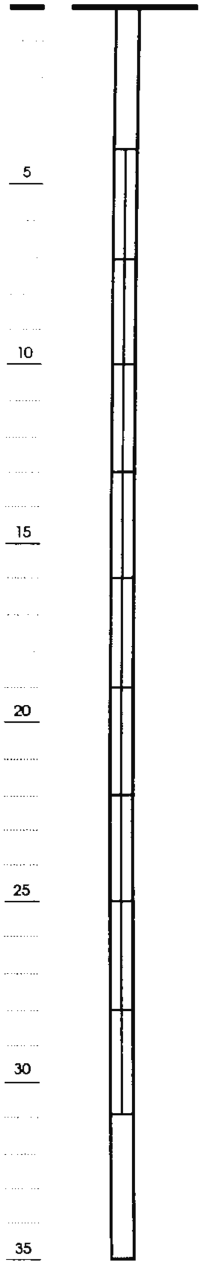
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			SILTY CLAY (CL), mottled dark brown and brown, moist, medium stiff, low plasticity.
5			
			SILTY CLAY (CL), mottled olive-gray and yellowish brown, moist, soft, medium plasticity, vertical root holes.
		0.0	
			CLAYEY SILT (ML), as above, very moist.
10			Wet.
			SILTY CLAY (CL), mottled dark gray and dark brown, slightly moist, very stiff, low plasticity.
		0.0	CLAYEY SILT (ML), mottled yellowish brown and olive-gray, moist, medium stiff, low plasticity, vertical root holes.
15			
			SILTY CLAY (CL), mottled light yellowish brown and gray, slightly moist, medium stiff, medium plasticity, abundant root holes and fractures, trace sand and gravel.
		0.0	
20			SANDY SILT (ML), mottled very light yellowish brown and gray, moist, low plasticity, very fine sand.
		0.0	CLAYEY SILT (ML), as above, medium plasticity, trace sand.
25			SILTY SAND (SM), light grayish brown, moist, medium dense, fine grained, subangular.
		0.0	
			SILTY SANDY GRAVEL (GM), yellowish brown, moist, medium dense, well graded, subrounded to 5 centimeters.
30			SANDY GRAVEL (GW), olive-brown, wet, loose, gap graded, medium-grained sand and well graded gravel to 4 centimeters, subangular.
	▼ ATD		Wet.
35			BOTTOM OF BORING AT 35 FEET.

Graphic Log



Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 3, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

JENIFER J.
No. 6650
Exp.

EXPLANATION

▤	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

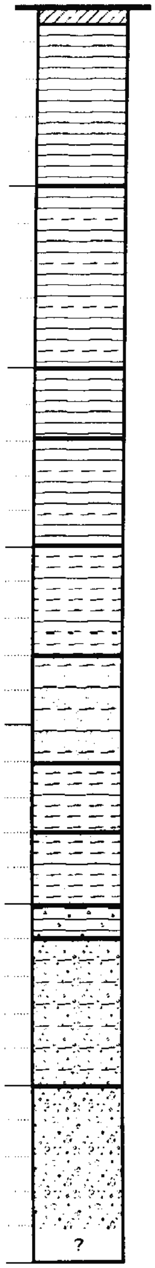
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 596-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
0			ASPHALT.	
			CLAY (CL), black, slightly moist, medium stiff, low to medium plasticity.	
5			SILTY CLAY (CL), dark olive-gray with brown, slightly moist, very stiff, low plasticity.	
		0.0		
10			CLAY (CL), mottled bluish gray and olive, moist, soft, low plasticity.	
		0.0	SILTY CLAY (CL), mottled dark bluish gray and olive-brown, very stiff, low plasticity, worm channels.	
15			CLAYEY SILT (ML), mottled gray and yellowish to olive-brown, slightly moist, soft, medium plasticity, vertical holes/channels.	
		0.0	Increasing fine sand.	
			CLAYEY SILTY SAND (SM), mottled olive-brown and gray, moist, medium dense, very fine grained.	
20				
			CLAYEY SILT (ML), mottled yellowish brown and gray, moist, medium stiff, low to medium plasticity, common vertical channels.	
		0.0	CLAYEY SANDY SILT (ML), mottled yellowish brown and gray, moist, soft, low plasticity.	
25			GRAVELLY CLAY (CL), yellowish brown and gray, very moist, soft, coarse angular gravel.	
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, moist, loose, gap graded, fine sand.	
30			SANDY GRAVEL (GW), olive-brown, wet, loose, well graded subangular to cobble size, coarse sand.	
	▼ ATD			
35			BOTTOM OF BORING AT 35 FEET.	

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 3, 1999
LFR Geologist: Todd Miller, R.G., CH.G

No. 6650
4/30/01

EXPLANATION

☰	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

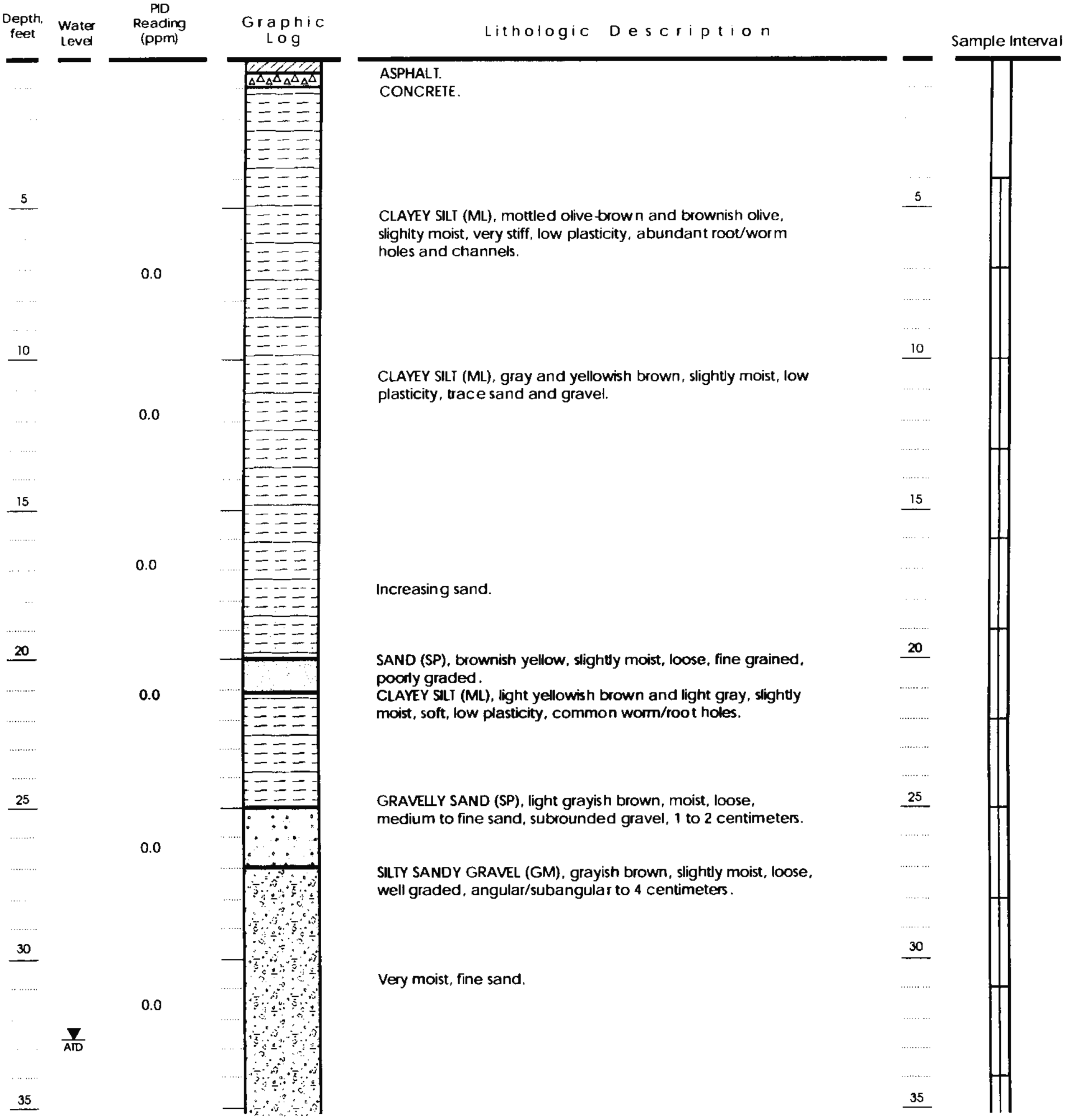
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 596-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT.
CONCRETE.

CLAYEY SILT (ML), mottled olive-brown and brownish olive, slighlty moist, very stiff, low plasticity, abundant root/worm holes and channels.

CLAYEY SILT (ML), gray and yellowish brown, slightly moist, low plasticity, trace sand and gravel.

Increasing sand.

SAND (SP), brownish yellow, slightly moist, loose, fine grained, poorly graded.
CLAYEY SILT (ML), light yellowish brown and light gray, slightly moist, soft, low plasticity, common worm/root holes.

GRAVELLY SAND (SP), light grayish brown, moist, loose, medium to fine sand, subrounded gravel, 1 to 2 centimeters.

SILTY SANDY GRAVEL (GM), grayish brown, slightly moist, loose, well graded, angular/subangular to 4 centimeters.

Very moist, fine sand.

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 4, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

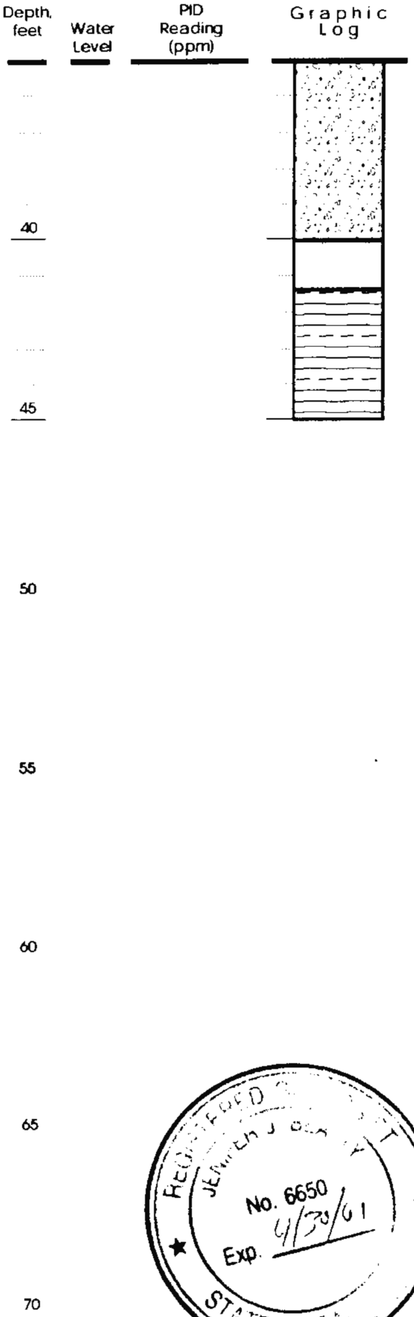
- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval

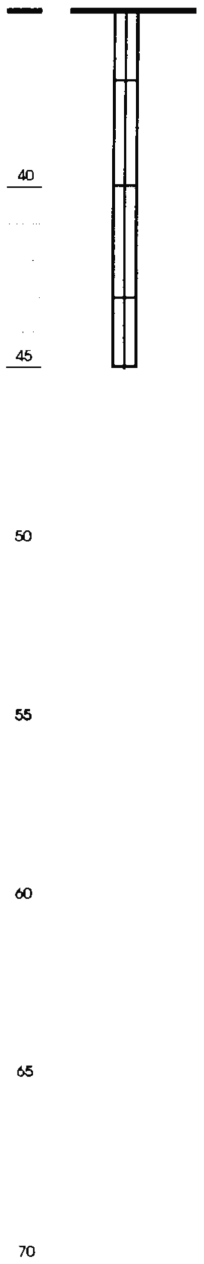


SANDY GRAVEL (GW), dark olive-brown, wet, loose, subangular and subround gravel, coarse sand.

SAND (SP), brownish olive, wet, medium dense, poorly graded, medium grained.

SILTY CLAY (CL), olive-brown and olive-gray, moist, very stiff, medium plasticity.

BOTTOM OF BORING AT 45 FEET.



No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 4, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

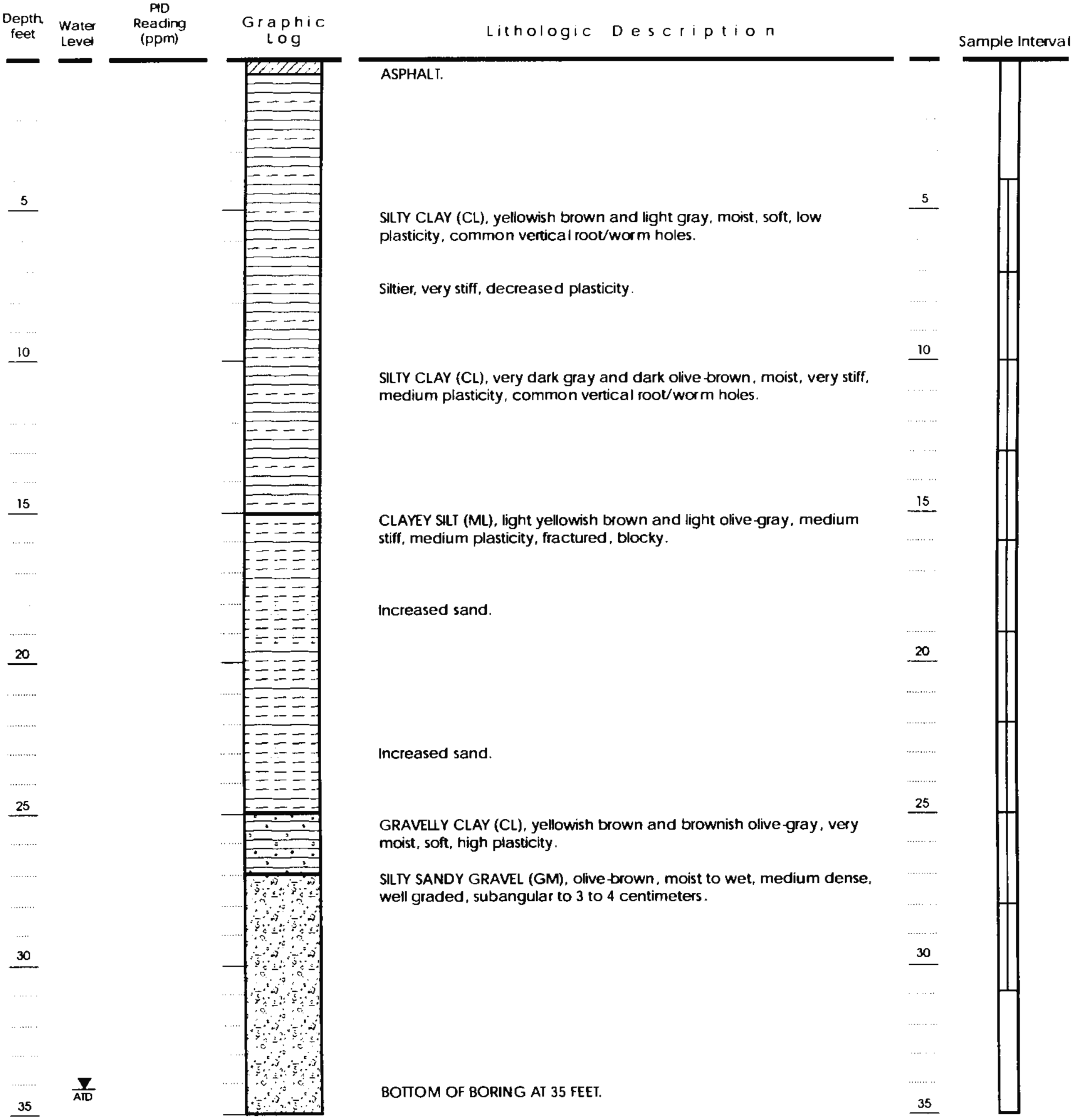
EXPLANATION

- ☰ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



ASPHALT.

SILTY CLAY (CL), yellowish brown and light gray, moist, soft, low plasticity, common vertical root/worm holes.

Siltier, very stiff, decreased plasticity.

SILTY CLAY (CL), very dark gray and dark olive-brown, moist, very stiff, medium plasticity, common vertical root/worm holes.

CLAYEY SILT (ML), light yellowish brown and light olive-gray, medium stiff, medium plasticity, fractured, blocky.

Increased sand.

Increased sand.

GRAVELLY CLAY (CL), yellowish brown and brownish olive-gray, very moist, soft, high plasticity.

SILTY SANDY GRAVEL (GM), olive-brown, moist to wet, medium dense, well graded, subangular to 3 to 4 centimeters.

BOTTOM OF BORING AT 35 FEET.

EXPLANATION

▤ Clay

▤ Silt

░ Sand

▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 4, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 596-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 597

Exxon
1705 McKee Road
San Jose, California 94086

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the San Jose Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Sediments encountered during drilling adjacent to the site consisted primarily of clay with some silt. Gravel was encountered in two of the borings to a depth of approximately 5 to 10 feet bgs. The shallowest depth to groundwater measured was approximately 8.5 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 12,000-gallon double-walled gasoline USTs constructed of fiberglass with double-walled fiberglass piping. The UST system utilizes electronic and continuous interstitial monitoring for piping leak detection, and manual inventory reconciliation, groundwater monitoring, and continuous interstitial monitoring for UST leak detection. Field observations indicate the UST system utilizes a vapor-assisted vapor recovery system.

RESULTS

Twenty soil samples and 8 groundwater samples were collected from borings drilled adjacent to the site. MtBE was detected in 1 of the 20 soil samples at a concentration of 8.4 μg/kg, and 6 of the 8 groundwater samples. MtBE concentrations in the groundwater samples ranged from 1.7 μg/l to 27 μg/l. With the exception of toluene, which was detected in one of the soil samples at a concentration of 6.2 μg/kg, no other petroleum hydrocarbon constituents (benzene, ethylbenzene, and/or xylenes) were detected in the soil or groundwater samples.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Waste oil release reported 8/90 during tank removal. No gas or BTEX detected in soil beneath gas tanks. Case closed 1/95.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes
Release date:	
Fuel released:	Gasoline
Location:	Not noted
Quantity (gallons):	Unknown
Data available:	Soil samples during piping upgrade

Comments:

Release discovered during piping upgrade in 1996. TPH-g was detected at 1.5 ppm in 1 of the 6 soil samples collected from underneath the piping. Toluene (up to 0.011 ppm), ethylbenzene (up to 0.016 ppm), and xylene (up to 0.23 ppm) were detected in 2 of the 6 soil samples.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1

Date installed:	Unknown
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping Information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring Electronic line leak test
Tank leak detection?	Manual inventory reconciliation Ground water monitoring Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2

Date installed:	Unknown
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring Electronic line leak test
Tank leak detection?	Manual inventory reconciliation Ground water monitoring Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3

Date installed:	
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring Electronic line leak test
Tank leak detection?	Manual inventory reconciliation Ground water monitoring Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #597
Santa Clara Valley Water District

	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
597-BH-01	03/24/99	10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.5-15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.0-20.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
597-BH-02	03/24/99	4.0-4.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		9.5-10.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.5-15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5-20.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
597-BH-03	03/24/99	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
597-BH-04	03/24/99	8.0-8.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	8.4	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		24.5-25.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
597-BH-05	03/25/99	2.0-2.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.5-15.0	<5	<1	<5	6.2	<5	<5	<5	<20	<20	<20	<200
		26.5-27.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
597-BH-06	03/25/99	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.5-18.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by ___CLC___.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 597
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
597-BH-01	03/24/99	21.5-25.0	3.1	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-02	03/24/99	8.0-20.0	1.7	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-02-DUP		8.0-20.0	2.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-03	03/24/99	13.0-20.0	2.6	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-04	03/24/99	9.5-25.0	27	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-04-DUP		9.5-25.0	26 J	<0.05 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	<1 UJ	<1 UJ	<1 UJ	<10 UJ
597-BH-05	03/25/99	15.0-28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
597-BH-06	03/25/99	17.0-22.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

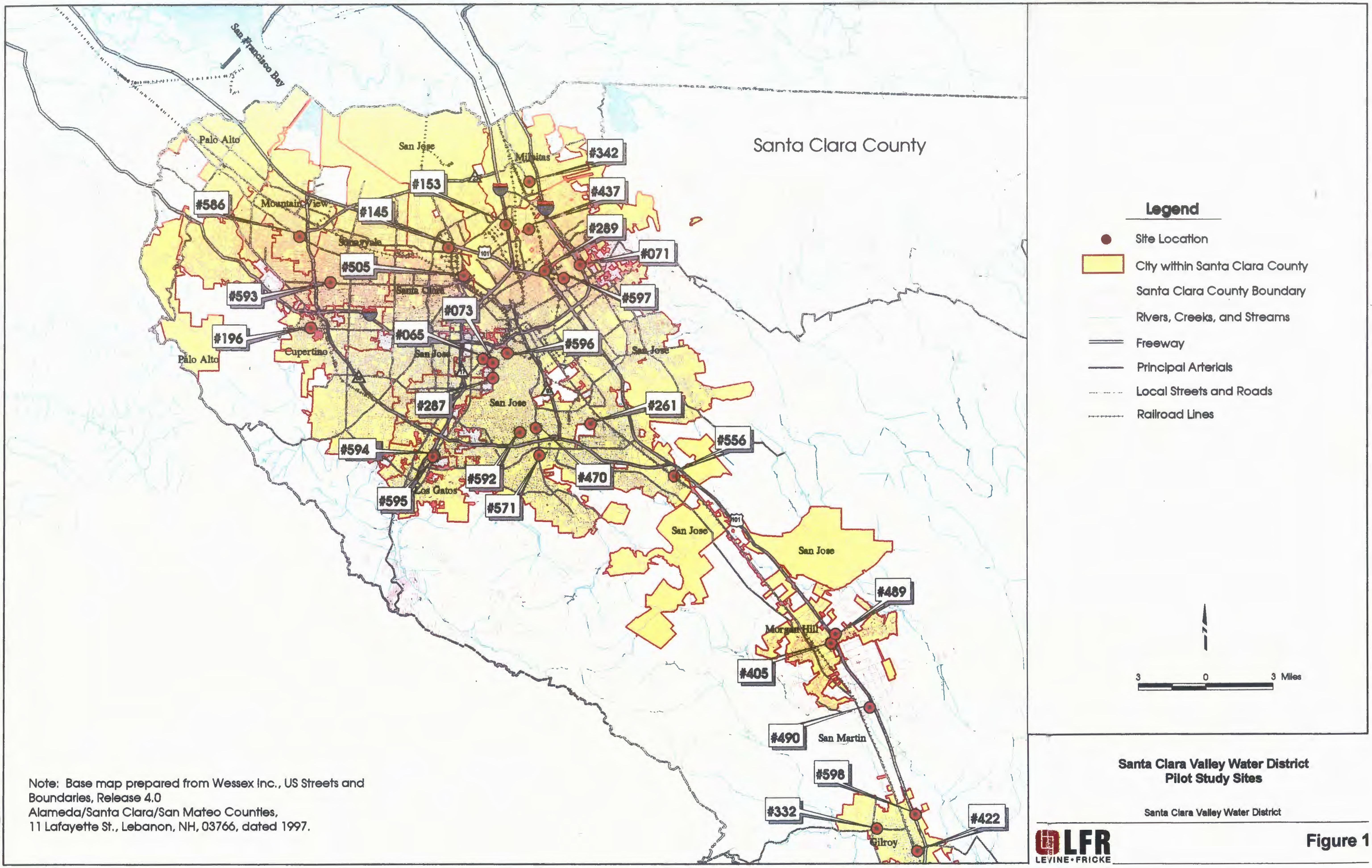
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



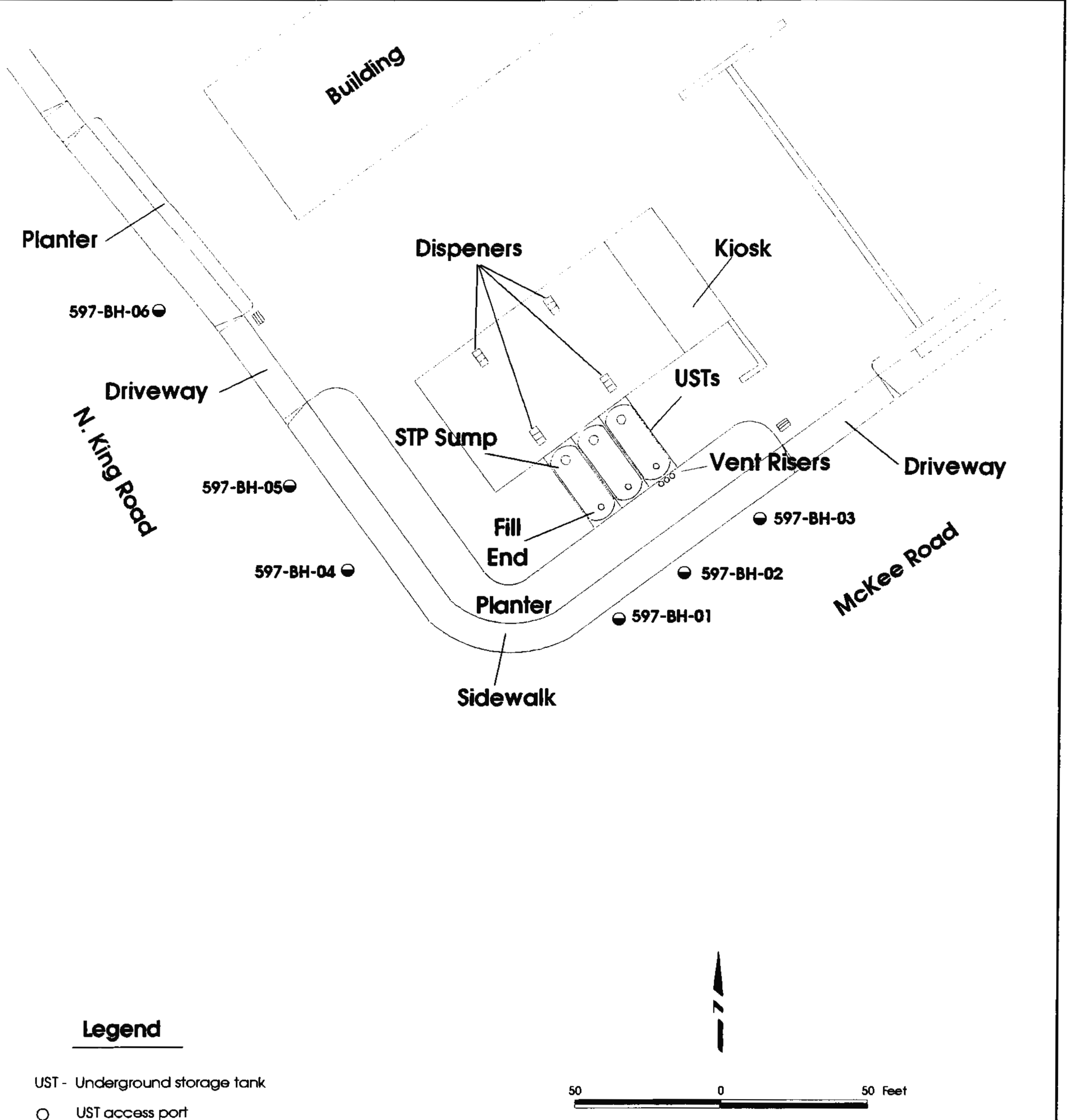
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

UST - Underground storage tank

○ UST access port

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

STP - Submersible Turbine Pump

Note: Base map prepared from LFR field plan.

Site #597

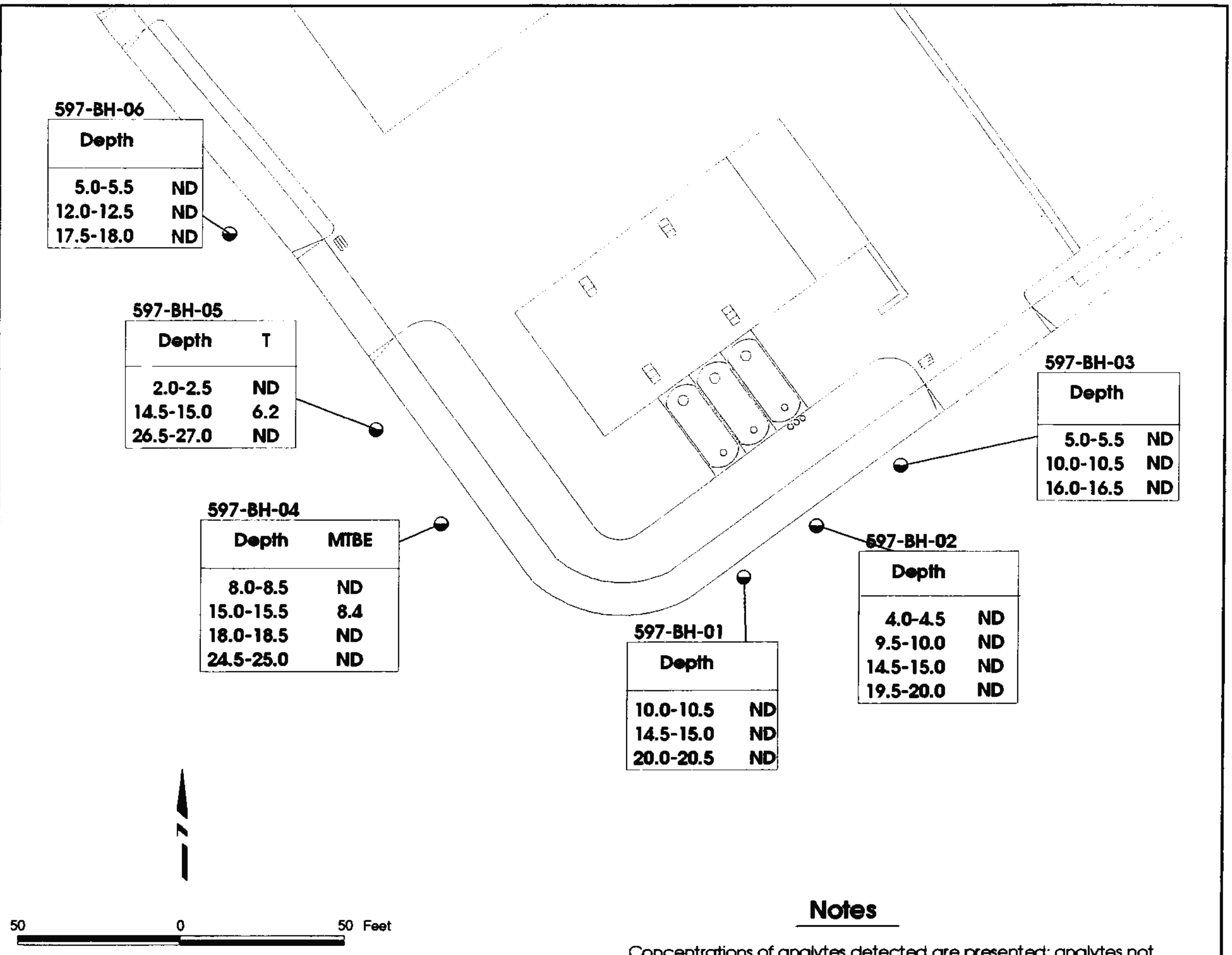
Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2

u:\scvw\figs\597.apr



597-BH-06

Depth	
5.0-5.5	ND
12.0-12.5	ND
17.5-18.0	ND

597-BH-05

Depth	T
2.0-2.5	ND
14.5-15.0	6.2
26.5-27.0	ND

597-BH-04

Depth	MTBE
8.0-8.5	ND
15.0-15.5	8.4
18.0-18.5	ND
24.5-25.0	ND

597-BH-03

Depth	
5.0-5.5	ND
10.0-10.5	ND
16.0-16.5	ND

597-BH-02

Depth	
4.0-4.5	ND
9.5-10.0	ND
14.5-15.0	ND
19.5-20.0	ND

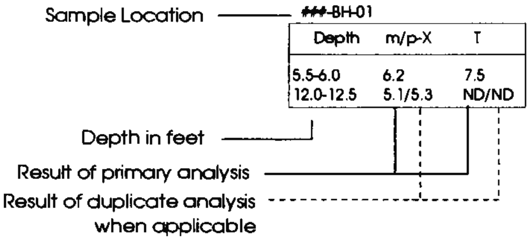
597-BH-01

Depth	
10.0-10.5	ND
14.5-15.0	ND
20.0-20.5	ND

Legend

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

UST - Underground storage tank

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

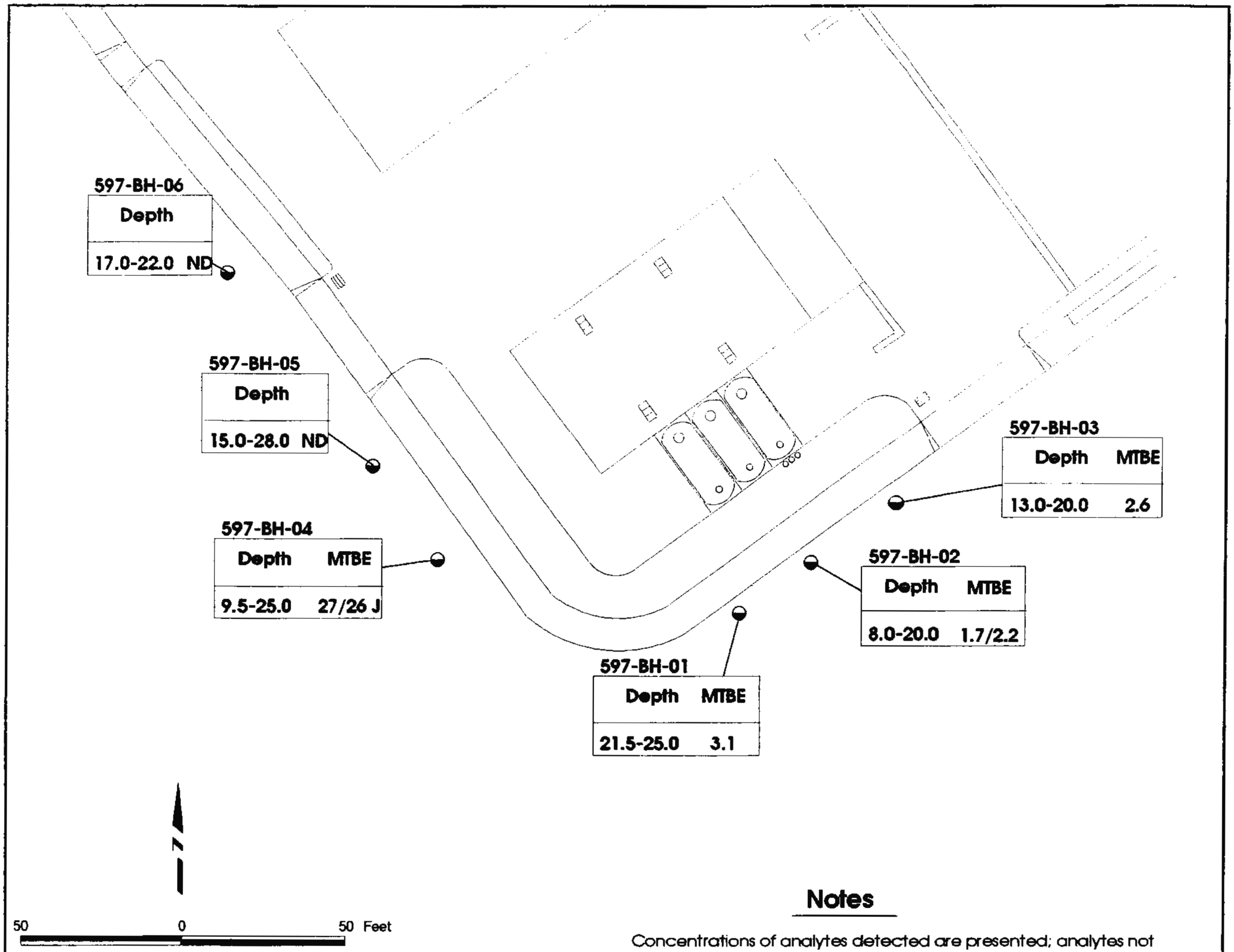
Site #597

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

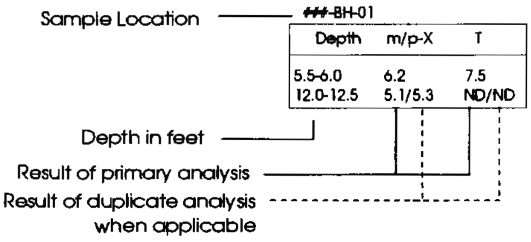
Figure 3



Legend

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

J = Estimated Value
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

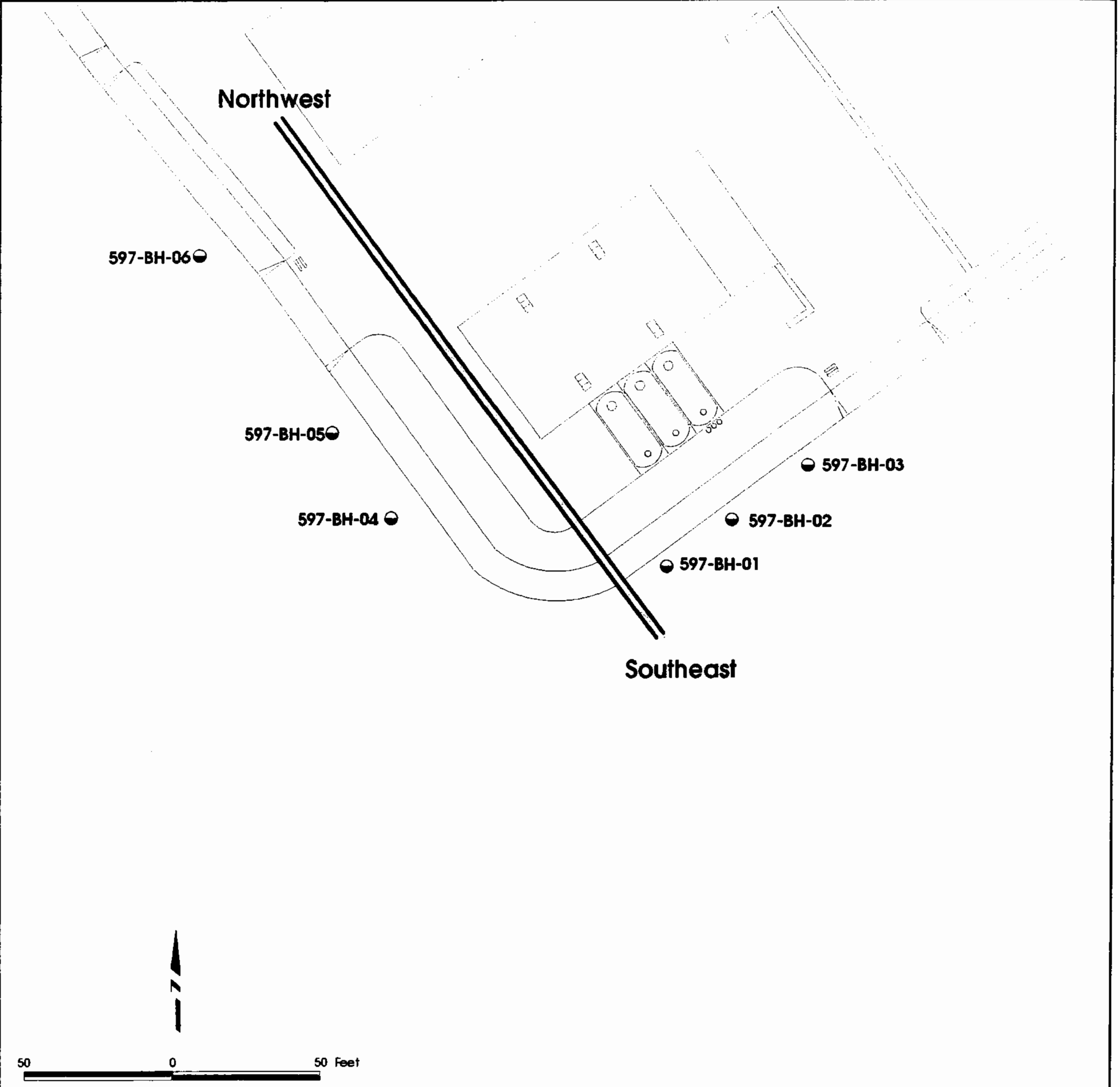
Site #597

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4



Legend

UST - Underground storage tank

○ UST access port

▭ Concrete slab

▬ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

See Figure 2 for description of site features and origin of base map.

u /scvwd/gis/597 apr

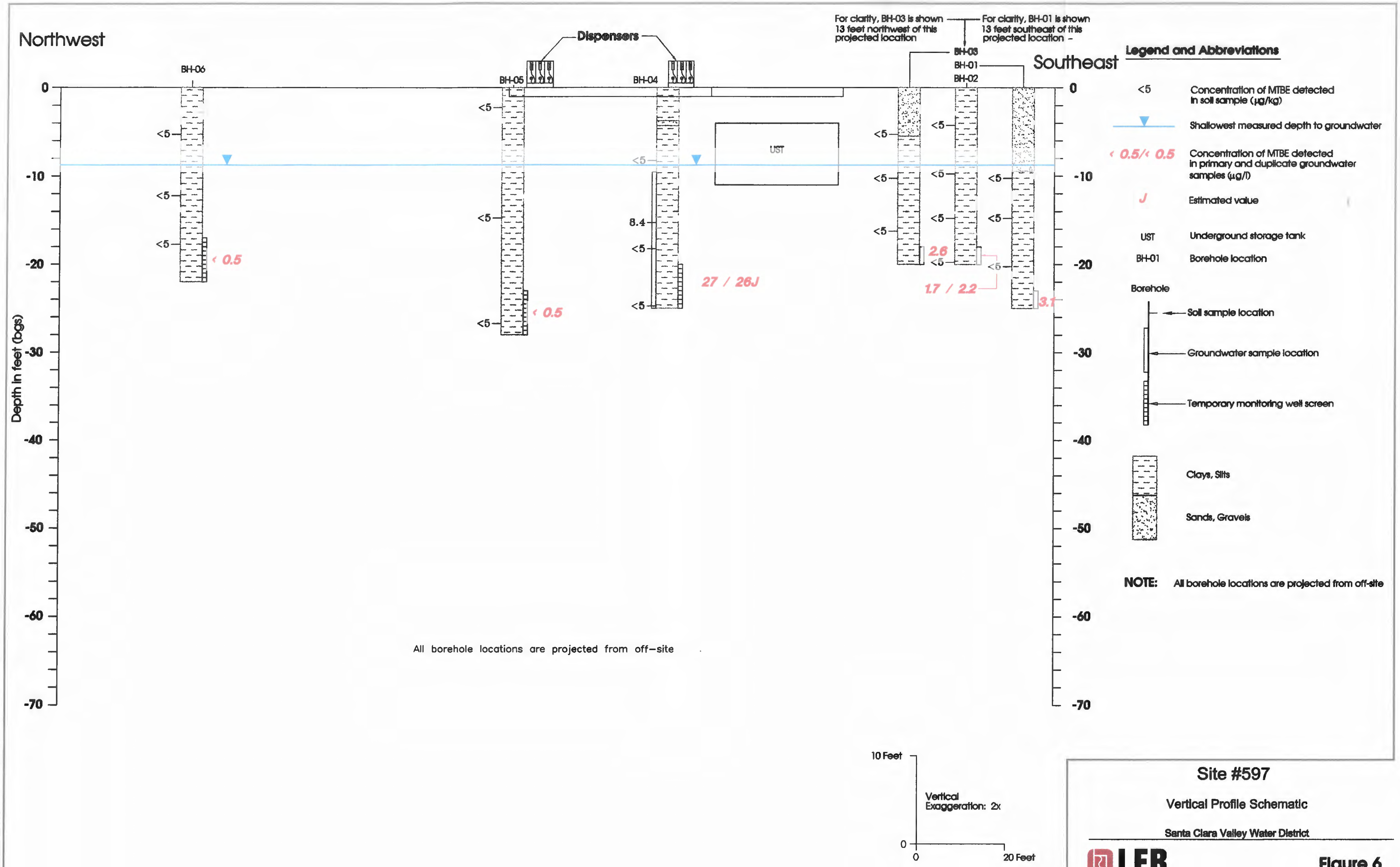
Site #597

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5


Northwest
Southeast
Dispensers
BH-06
BH-05
BH-04
BH-03
BH-01
BH-02
For clarity, BH-03 is shown 13 feet northwest of this projected location
For clarity, BH-01 is shown 13 feet southeast of this projected location
UST
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
<5
8.4
‹ 0.5
27 / 26J
2.6
1.7 / 2.2
3.1
All borehole locations are projected from off-site
10 Feet
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
‹ 0.5/‹ 0.5 Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
J Estimated value
UST Underground storage tank
BH-01 Borehole location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Clays, Silts
Sands, Gravels
NOTE: All borehole locations are projected from off-site

Site #597

Vertical Profile Schematic

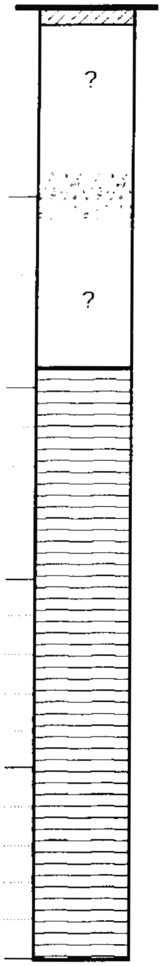
Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 6

J:\ENGCAD\6730\CM\597.DWG 05/18/99 x-sec.PCP

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
0			ASPHALT.
5			GRAVEL (GW), gray, dry, loose?, very poor recovery, angular, well graded, clasts to 3-centimeter diameter, some sand silt.
	▼ ATD		
10			CLAY (CL), olive-brown mottled with gray, slightly moist, very stiff, slight plasticity.
15			
20			Low plasticity.
			CLAY (CL), dark gray, mottled olive-gray with olive-brown, moist, medium stiff to soft, medium to high plasticity.
25			BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▥ Silt
▢ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR LEVINE•FRICKE

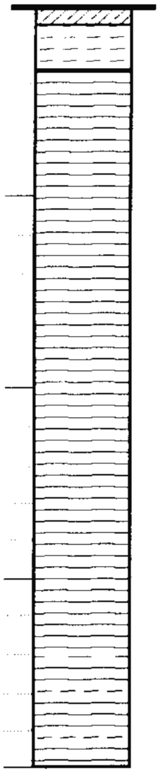
LITHOLOGY FOR 597-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT. SANDY SILT (ML) with GRAVEL (ML), yellowish brown, moist, low to medium plasticity, medium sand, fine rounded gravel.
			CLAY (CH), black, moist, hard, medium plasticity.
5			Dark yellowish brown with dark bluish gray, staining along fractures/worm (root?) holes.
			High plasticity.
	▼ ATD		
10			
			Very stiff, increasing gray staining.
15			
			Soft, increased silt.
20			BOTTOM OF BORING AT 20 FEET.
25			
30			
35			

Graphic Log



Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 24, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

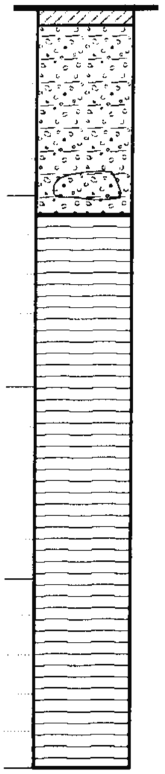
LFR LEVINE•FRICKE

LITHOLOGY FOR 597-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT.

SILTY GRAVEL (GM), yellowish brown, slightly moist, dense, well graded, (Fill?).

COBBLE.

CLAY (CL), light grayish brown, slightly moist, very stiff, low plasticity, vertical root/worm holes.

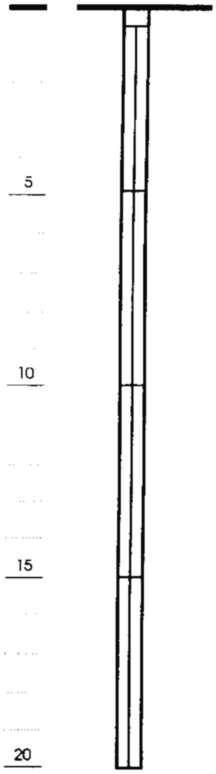
Pronounced mottling, olive-brown with dark gray.

Slight plasticity.

Low plasticity.

CLAY (CL), very dark olive-gray, moist, soft, high plasticity, portions mottled dark gray to black.

BOTTOM OF BORING AT 20 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 24, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

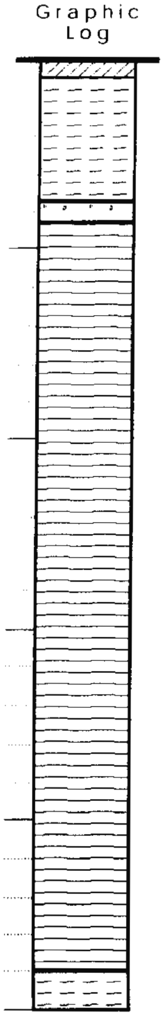
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

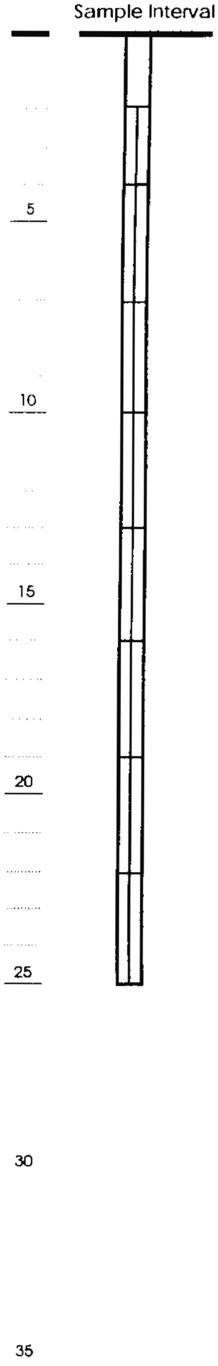
LITHOLOGY FOR 597-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			SANDY SILT (ML) with GRAVEL, dark yellowish brown, moist, very dense, fine to medium sand.
			GRAVELLY SAND (SP), gray, moist, loose, fine to medium grained, fine subrounded gravel.
5		0.0	CLAY (CH), olive-brown, moist, stiff, medium plasticity, trace medium sand.
	▼ ATD	0.0	
10			
		0.0	
15		0.0	
		0.0	Olive-gray, wet, soft, **high** plasticity. Moist, medium stiff, gray staining, worm/root holes.
20			
		0.0	Black.
			Olive-gray, moist, medium stiff, high plasticity, increased silt content.
25		0.0	SILT (MH), dark gray with extensive olive-brown mottling, moist, medium stiff, high plasticity.
			BOTTOM OF BORING AT 25 FEET.
30			
35			



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 24, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
░	Sand
▒	Gravel

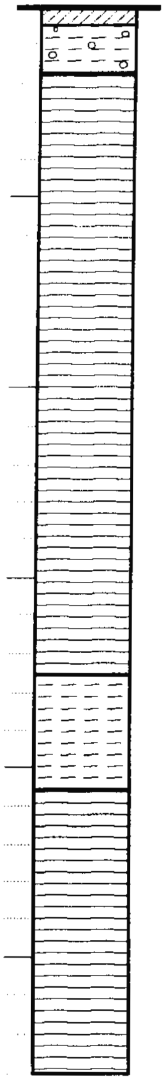
PID - Photoionization Detector

▼ Water level at time of drilling

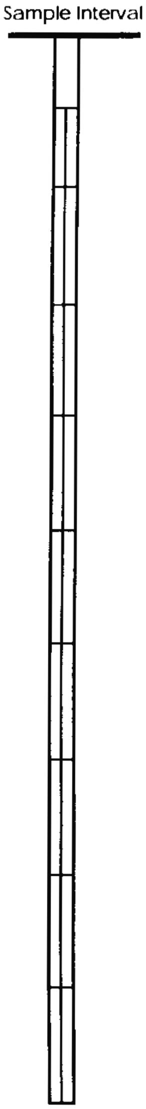
LFR
LEVINE•FRICKE

LITHOLOGY FOR 597-BH-04 *(page 1 of 1)*

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT. SANDY SILT with GRAVEL.
		0.0	
			CLAY (CH), black, moist, stiff, medium plasticity.
5		0.0	Dark brown, trace medium sand. Gray staining.
		0.0	
10			
		0.0	
			Root/worms holes with gray staining.
15		0.0	
		0.0	SILT (ML), dark bluish gray, moist, medium stiff, high plasticity, fine (less than 4 millimeters) concretions.
20			
		0.0	CLAY (CH), grayish black, moist, stiff, high plasticity, trace fine concretions.
			Dark olive-brown mottling.
		0.0	
25			Dark gray with dark olive-brown mottling, soft.
			Stiff, trace fine rounded gravel.
		0.0	
			BOTTOM OF BORING AT 28 FEET.
30			
35			



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 25, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

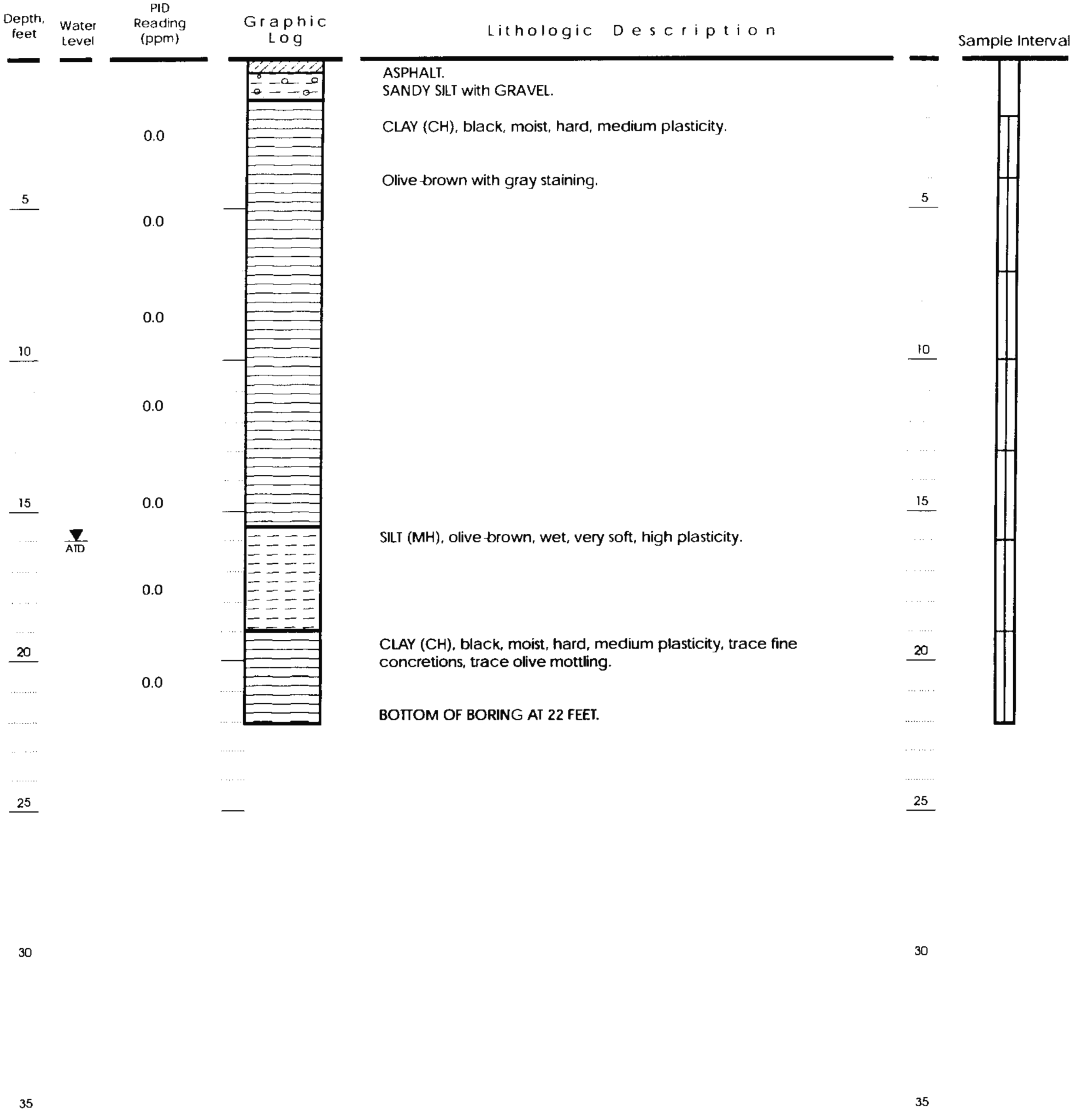
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 597-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT.
SANDY SILT with GRAVEL.

CLAY (CH), black, moist, hard, medium plasticity.

Olive-brown with gray staining.

SILT (MH), olive-brown, wet, very soft, high plasticity.

CLAY (CH), black, moist, hard, medium plasticity, trace fine concretions, trace olive mottling.

BOTTOM OF BORING AT 22 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 25, 1999
LFR Geologist:	Rodney Crother, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 597-BH-06 *(page 1 of 1)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 598

Unocal
601 Leavesley Road
Gilroy, California 95020

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Gilroy Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology generally consists of clays and silts to approximately 10 feet below the ground surface (bgs) underlain by sands and gravels to approximately 28 feet bgs. CPT data for the site indicates that the sands and gravels are present to approximately 46 feet bgs. The shallowest depth to groundwater measured was approximately 17 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 10,000-gallon single-walled gasoline USTs constructed of fiberglass, with 100% methanol compatible lining, fiberglass reinforced plastic (FRP) exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes mechanical line leak detection, automatic pump shutdown for piping leak detection, and automatic tank gauging for UST leak detection.

RESULTS

MtBE was detected in soil-gas, soil, and groundwater samples collected from the site. MtBE was detected in 4 of the 10 soil-gas samples at concentrations ranging from an estimated 110 μg/l to 520 μg/l, 2 of 18 soil samples at concentrations of 41 μg/kg to 260 μg/kg, and 3 of the 7 groundwater samples at concentrations ranging from 3.5 μg/l to 280 μg/l. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in 11 of the 12 soil-gas samples at concentrations ranging from 1.0 μg/l (toluene) to 54 μg/l (benzene). TPH as gasoline was detected in 4 of the 12 soil-gas samples at concentrations ranging from 110 μg/l to 71,000 μg/l. Petroleum hydrocarbon constituents (toluene, ethylbenzene, and xylenes) were detected in 1 of the 12 soil samples at concentrations ranging from 89 μg/kg (toluene) to 8,600 μg/kg (meta/para-xylene). TPH as gasoline was detected in the same sample at 95 mg/kg. TPH as gasoline, benzene, and toluene were detected in groundwater samples at concentrations of 0.38 mg/l, 2.8 μg/l, and 0.52 μg/l, respectively.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Gasoline release reported in 10/88. No groundwater contamination (including MtBE) detected as of 6/96 sampling. Case closed 6/97.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

TOSCO file review conducted. Summary report (GeoStrategies, 12/95) describes environmental work dating back to 8/86. Work subsequent to 8/86 involved discoveries of hydrocarbon impacted soil (10/88 and 4/89) and associated soil excavation, dispenser and piping replacements (southern dispenser-4/89, northern dispenser-7/93), installation of vadose-zone and groundwater monitoring wells (11/88 and 9/89), quarterly monitoring beginning 10/90, well abandonment (vadose-zone and groundwater montioring wells) in 8/93, and waste-oil UST removal in 8/93. Soil sample collected during the 8/93 waste-oil UST removal had no detectable concentrations of TPHg, TPHd, BTEX, halogenated volatile organics or semi-volatile organics. In 1995, another waste-oil UST was removed (7/95) as well as hydraulic hoists (7/95), product piping and dispensers (8/95). Soil samples collected from beneath the waste-oil tank and product piping did not contain TPHg or BTEX. One of 6 soils samples collected from beneath the former piping and dispenser contained TPHg (1.3 mg/kg) and benzene (0.074 mg/kg). In 9/95, petroleum hydrocarbons (TPHg up to 440 mg/kg) were detected in soil during excavation for installation of the new product line and southwestern dispenser. Soil was excavated to a final depth of 12 to 15 feet bgs (approx. 48 tons of soil removed). No TPHg or benzene was detected in a soil sample collected from the base of the final excavation. Two of the 4 sidewall samples contained concentrations of TPHg (5.4 and 2.5 mg/kg) and benzene (0.022 and 0.30 mg/kg). The report concluded that no additional work was warranted based on the low concentrations of petroleum hydrocarbons remaining in soil and the low concentrations of petroleum hydrocarbons periodically detected in groundwater. Gilroy Fire Department files also reviewed.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes
Date of last test:	Within 6 months of the inspection
Method of tank testing:	Overfill
Tank leak rate (gallons/hour):	<0.01
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes

Under island containment present?	Yes
Under island containment monitoring:	Float switch
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Unknown - System was equipped with pressure/vacuum
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 3 years
Years of operation as fueling facility:	Approximately 29 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Monitoring system was recently calibrated and tested for State Certification. Float monitors in several under island dispensers were too long, rendering them ineffective. Performed functional test on liquid detectors in turbine sumps - passed.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Not available
Spill log reviewed?	Yes
Spill log comments:	None
Personnel training:	Good

Comments:

Owners are on-site, but fairly new. However, they seemed very knowledgeable of the tank system.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To southwest corner of site (catch basin)
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storrm drain

Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable
Comments:	

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 001

Date installed:	1979
Tank capacity (gallons):	9,886
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1992
Date overfill protection equipment installed:	1992
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Automatic tank gauging

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 002

Date installed:	1979
Tank capacity (gallons):	9,886
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1992
Date overfill protection equipment installed:	1992
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Automatic tank gauging

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 003

Date installed:	1979
Tank capacity (gallons):	9,886
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1992
Date overfill protection equipment installed:	1992
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Automatic tank gauging

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #598
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
598-SG-01	03/17/99	13	<5	<100	<1	1.3	<1	<1	<1	
		18	<5	1200	<1	1.0	<1	<1	<1	
598-SG-01-SPL		18	<0.65	NA	<0.14	<0.17	<0.20	<0.20	<0.20	
598-SG-02	03/17/99	13	250	38000	27	5.0	1.3	<1	<1	
598-SG-02-SPL		13	<3.6	NA	<0.79	<0.93	<1.1	<1.1	<1.1	
598-SG-02		17	490 J	71000	54 J	8.5 J	<1 UJ	1.2 J	<1 UJ	
598-SG-03	03/17/99	8	<5	390	<1	2.5	<1	<1	<1	
		14	110 J	19000	14 J	4.3 J	<1	<1	<1	
		17	520	55000	54	10.0	<1	1.6	<1	
598-SG-04	03/18/99	9	<5	<100	<1	<1	<1	<1	<1	
		14	<5	<100	<1	1.2	<1	<1	<1	
		17	<5	110	<1	1.2	<1	<1	<1	

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #598
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
598-BH-01	03/22/99	10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.5-15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5-20.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
598-BH-02	03/22/99	11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	610
		16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	41	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
598-BH-03	03/22/99	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5-20.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
598-BH-04	03/23/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.5-13.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.5-18.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
598-BH-05	03/23/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
598-BH-06	03/23/99	5.0-5.5	260	95	<32	89	1200	8600	4400	<130	<130	<130	<1300
		11.5-12.0	<5	<1	<5	<5	<5	24	11	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	6.8	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 598
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
598-BH-01	03/22/99	17.5-27.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-01-DUP		17.5-27.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-02	03/22/99	18.0-28.0	3.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-03	03/22/99	15.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-04	03/23/99	12.0-22.0	280	0.38	2.8	0.52	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-05	03/23/99	12.0-22.0	46	0.051	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
598-BH-06	03/23/99	15.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

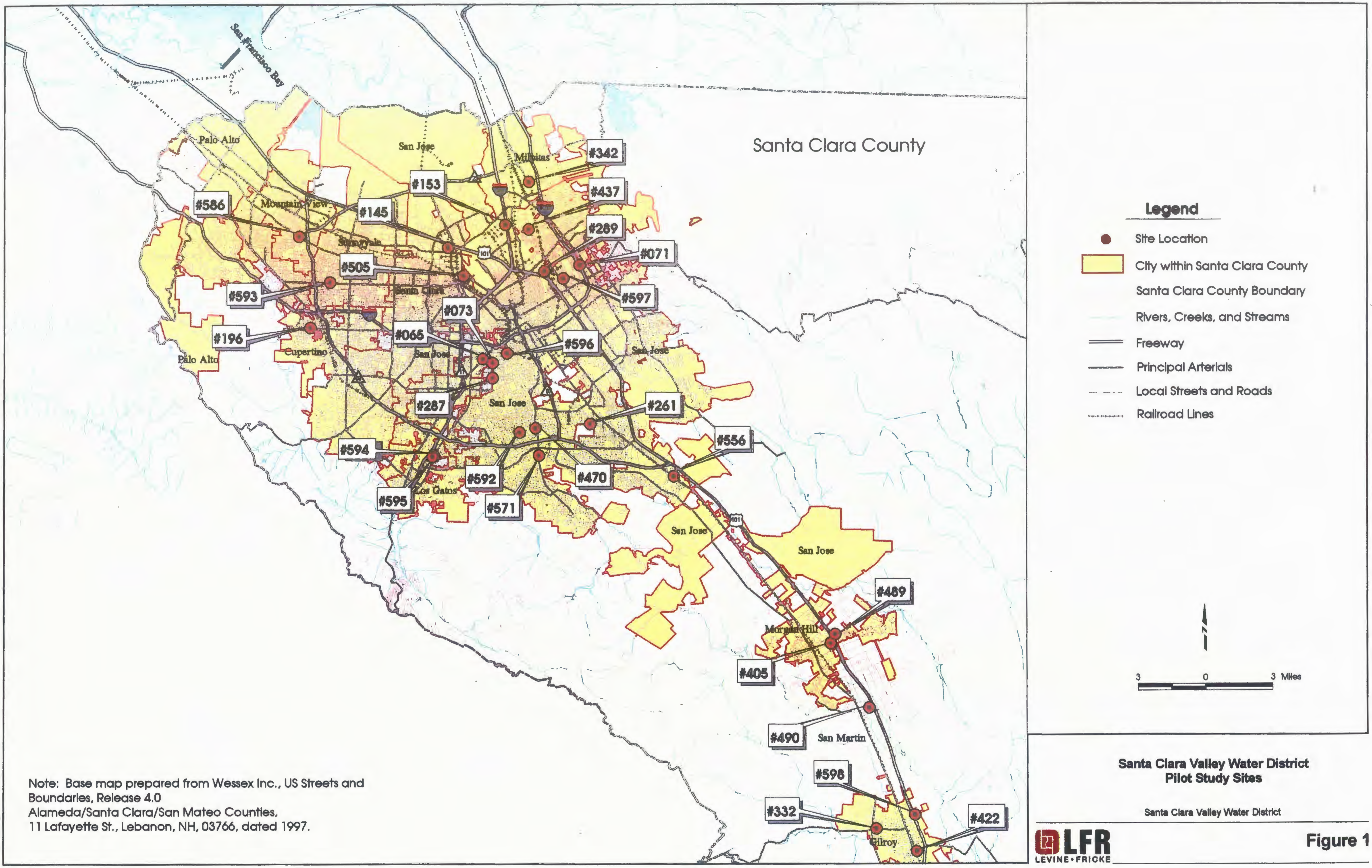
Table 4
Summary of Physical Parameters for Soil Samples - Site #598
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
598-BH-03	7.5 - 8.0	Brown clay	0.04	18.27	139.7	118.1	29.89
	11.5 - 12.0	Brown gravelly sand	0.03	7.36	125.5	116.9	30.60

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



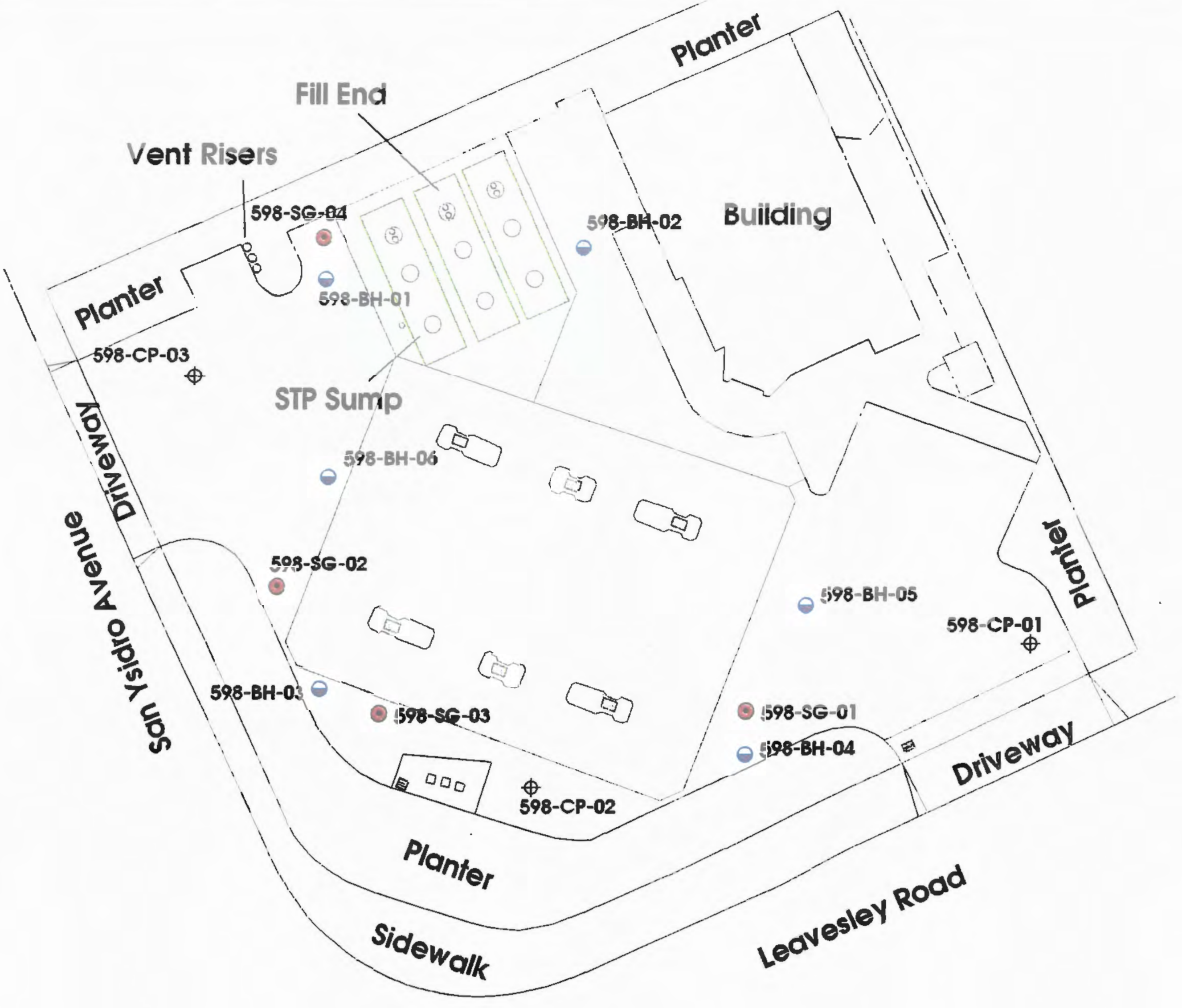
Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 1



Legend

🟩 Gasoline underground storage tank and dispenser.

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Site Plan, Unocal Service Station No. 6230, 601 Leavesley Road, Gilroy, California, by GSI GeoStrategies, dated 11/96.

30 0 30 Feet

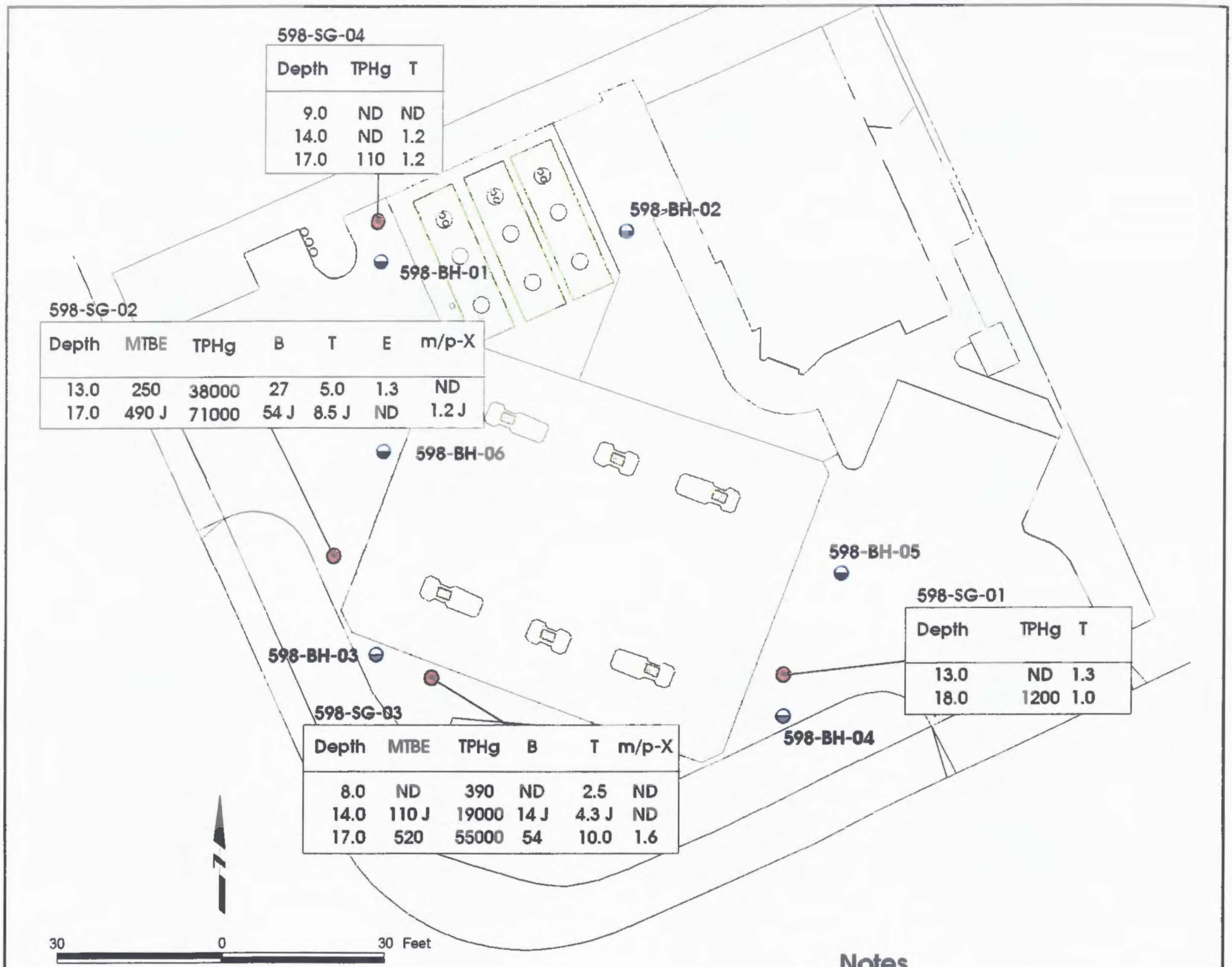
Site #598

Site Plan

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 2



598-SG-04

Depth	TPHg	T
9.0	ND	ND
14.0	ND	1.2
17.0	110	1.2

598-SG-02

Depth	MTBE	TPHg	B	T	E	m/p-X
13.0	250	38000	27	5.0	1.3	ND
17.0	490 J	71000	54 J	8.5 J	ND	1.2 J

598-SG-01

Depth	TPHg	T
13.0	ND	1.3
18.0	1200	1.0

598-SG-03

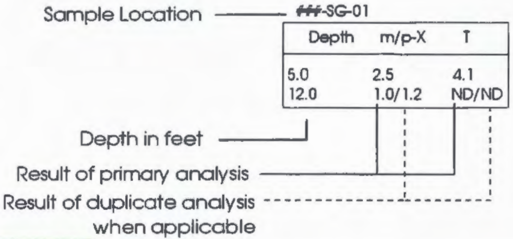
Depth	MTBE	TPHg	B	T	m/p-X
8.0	ND	390	ND	2.5	ND
14.0	110 J	19000	14 J	4.3 J	ND
17.0	520	55000	54	10.0	1.6

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-SG-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

▭ Gasoline underground storage tank and dispenser.

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)

J = Estimated Value
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

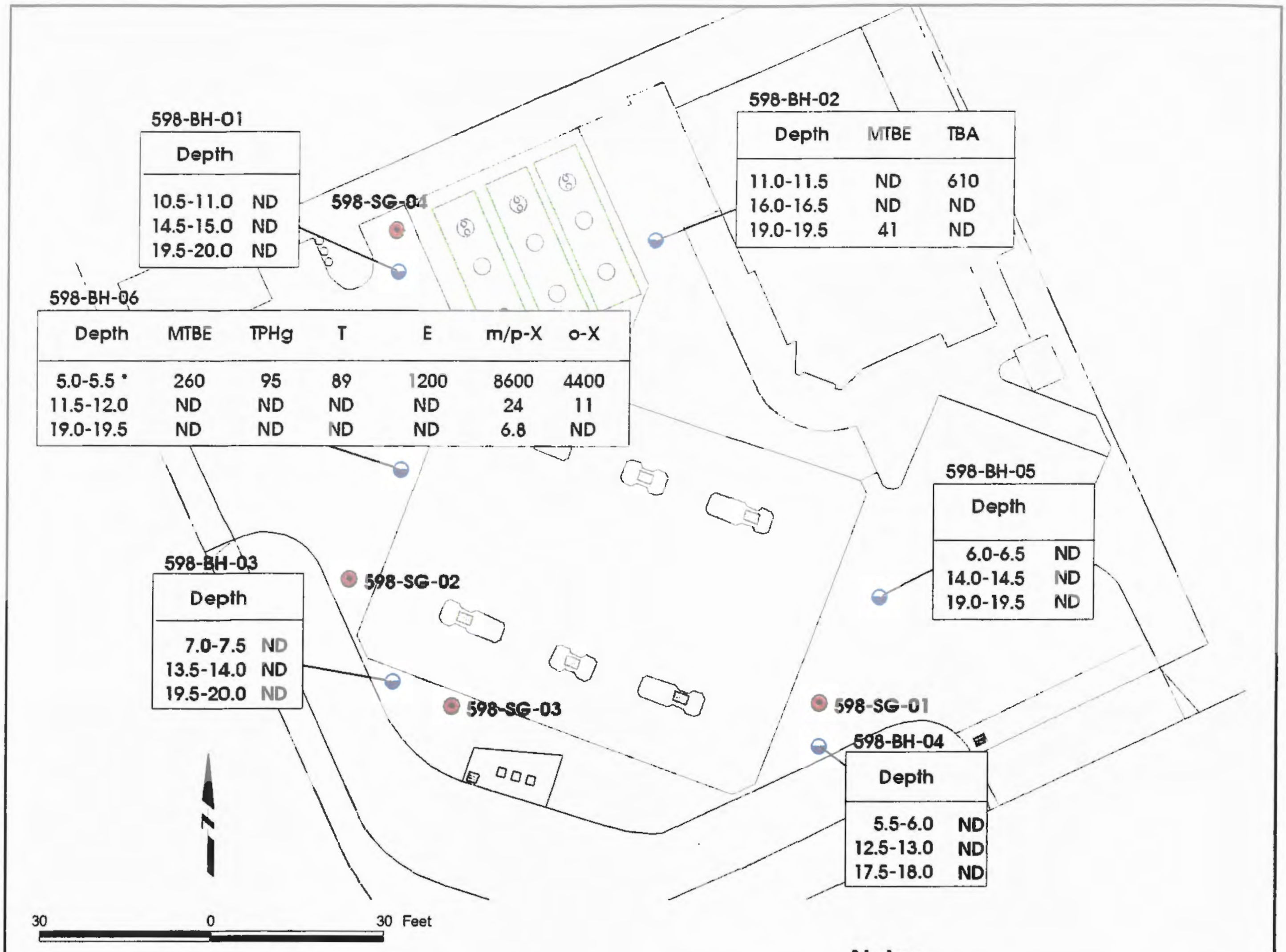
Site #598

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 3



598-BH-01

Depth	
10.5-11.0	ND
14.5-15.0	ND
19.5-20.0	ND

598-BH-02

Depth	MTBE	TBA
11.0-11.5	ND	610
16.0-16.5	ND	ND
19.0-19.5	41	ND

598-BH-06

Depth	MTBE	TPHg	T	E	m/p-X	o-X
5.0-5.5 *	260	95	89	1200	8600	4400
11.5-12.0	ND	ND	ND	ND	24	11
19.0-19.5	ND	ND	ND	ND	6.8	ND

598-BH-03

Depth	
7.0-7.5	ND
13.5-14.0	ND
19.5-20.0	ND

598-BH-05

Depth	
6.0-6.5	ND
14.0-14.5	ND
19.0-19.5	ND

598-BH-04

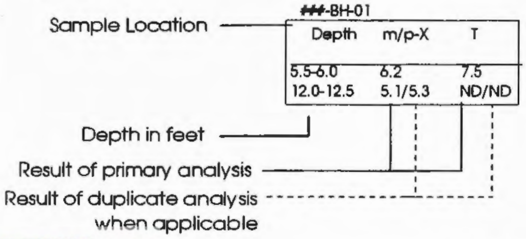
Depth	
5.5-6.0	ND
12.5-13.0	ND
17.5-18.0	ND

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank and dispenser.

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

* Indicates elevated RL (see results table for reporting limits)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

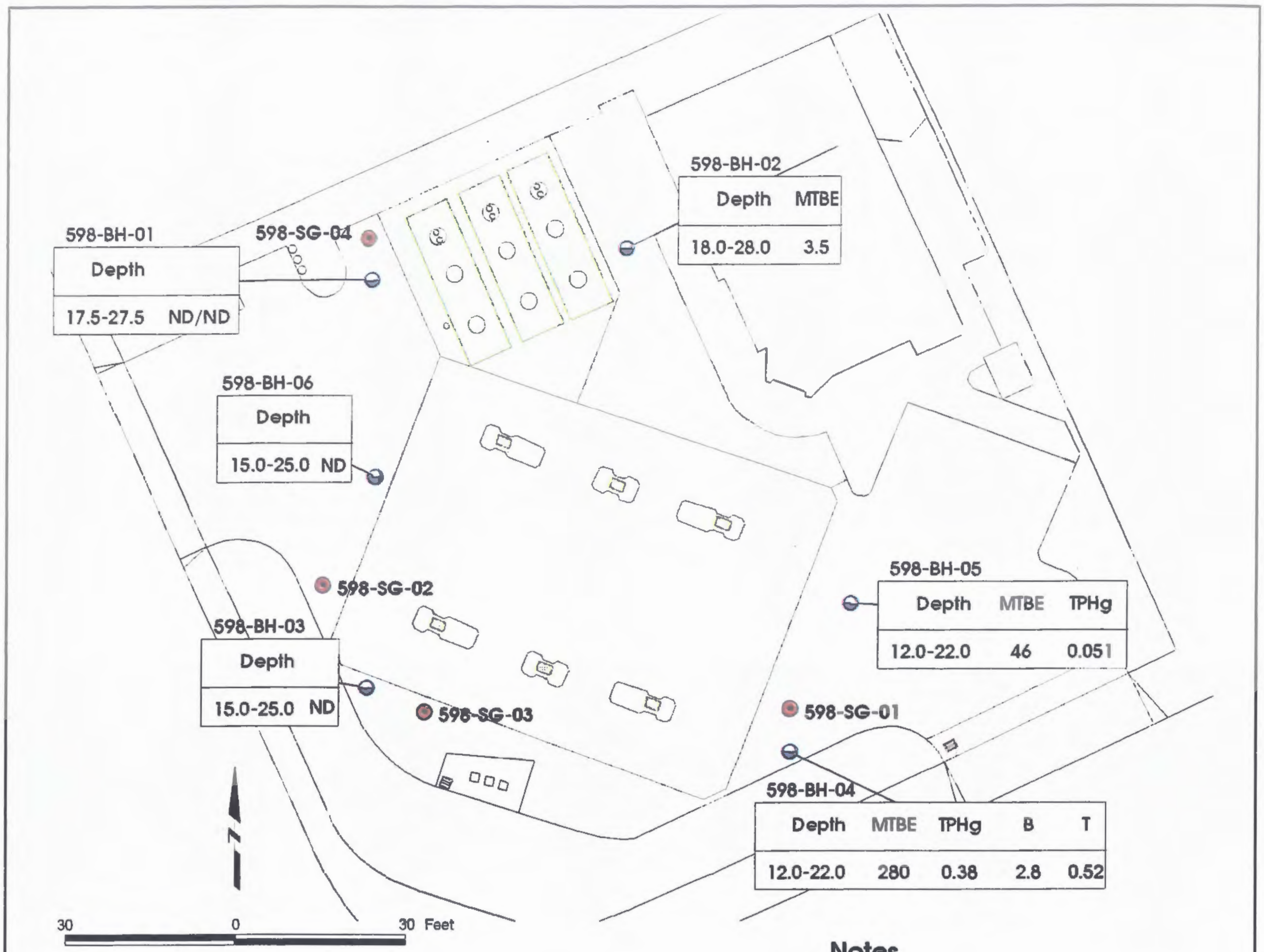
Site #598

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 4

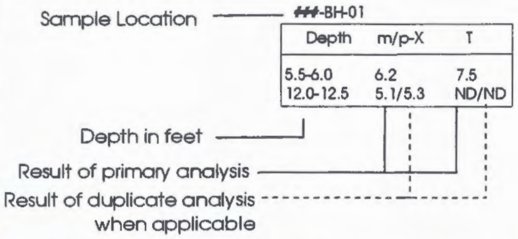


Legend

⊖ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank and dispenser.

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

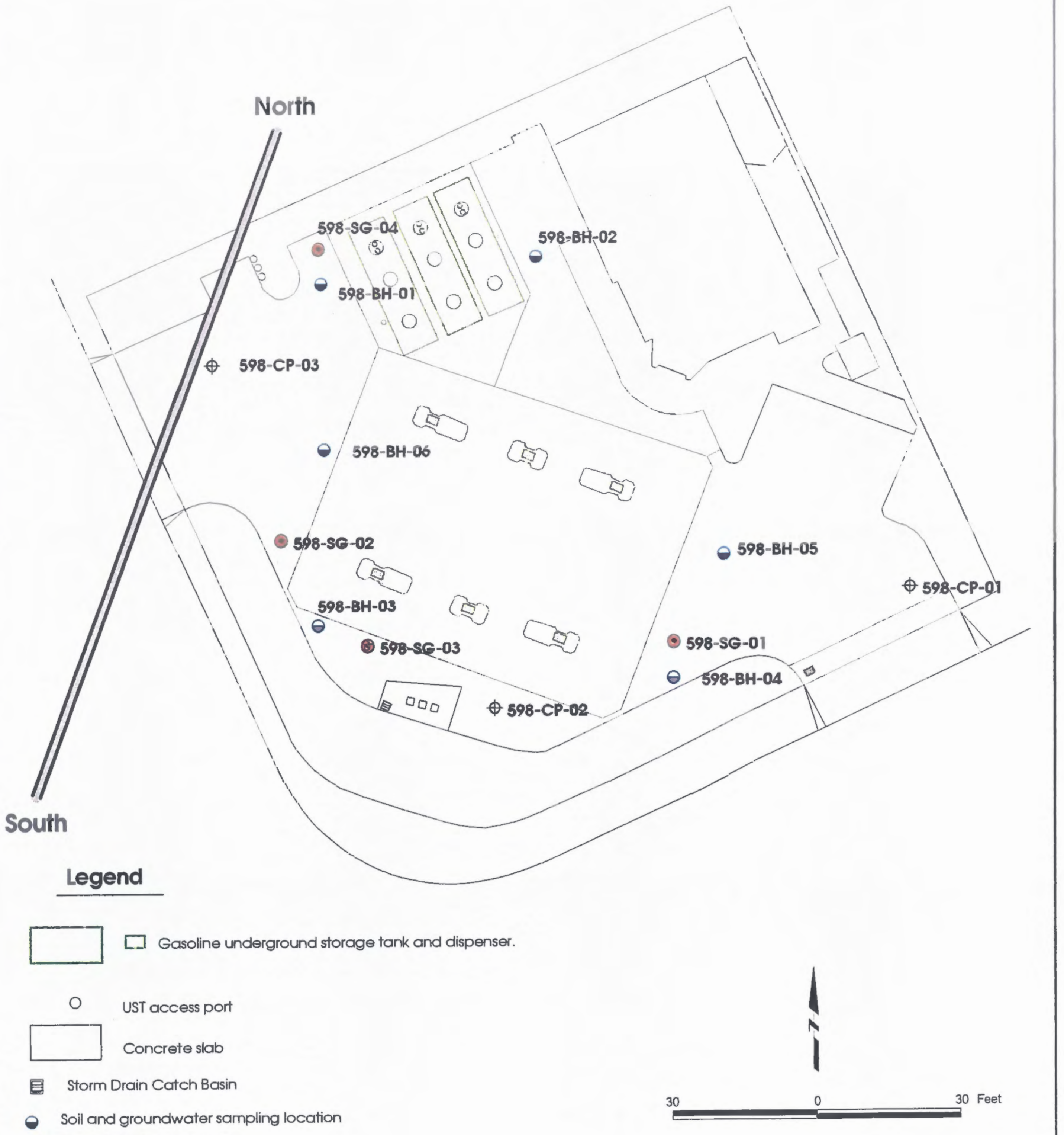
Site #598

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 5


North
South
598-SG-04
598-BH-01
598-BH-02
598-CP-03
598-BH-06
598-SG-02
598-BH-05
598-CP-01
598-BH-03
598-SG-03
598-SG-01
598-BH-04
598-CP-02
Legend
☐ Gasoline underground storage tank and dispenser.
○ UST access port
☐ Concrete slab
▤ Storm Drain Catch Basin
◒ Soil and groundwater sampling location
● Soil-gas sampling location
⊕ Cone-penetrometer test location
30
0
30 Feet

See Figure 2 for description of site features and origin of base map.

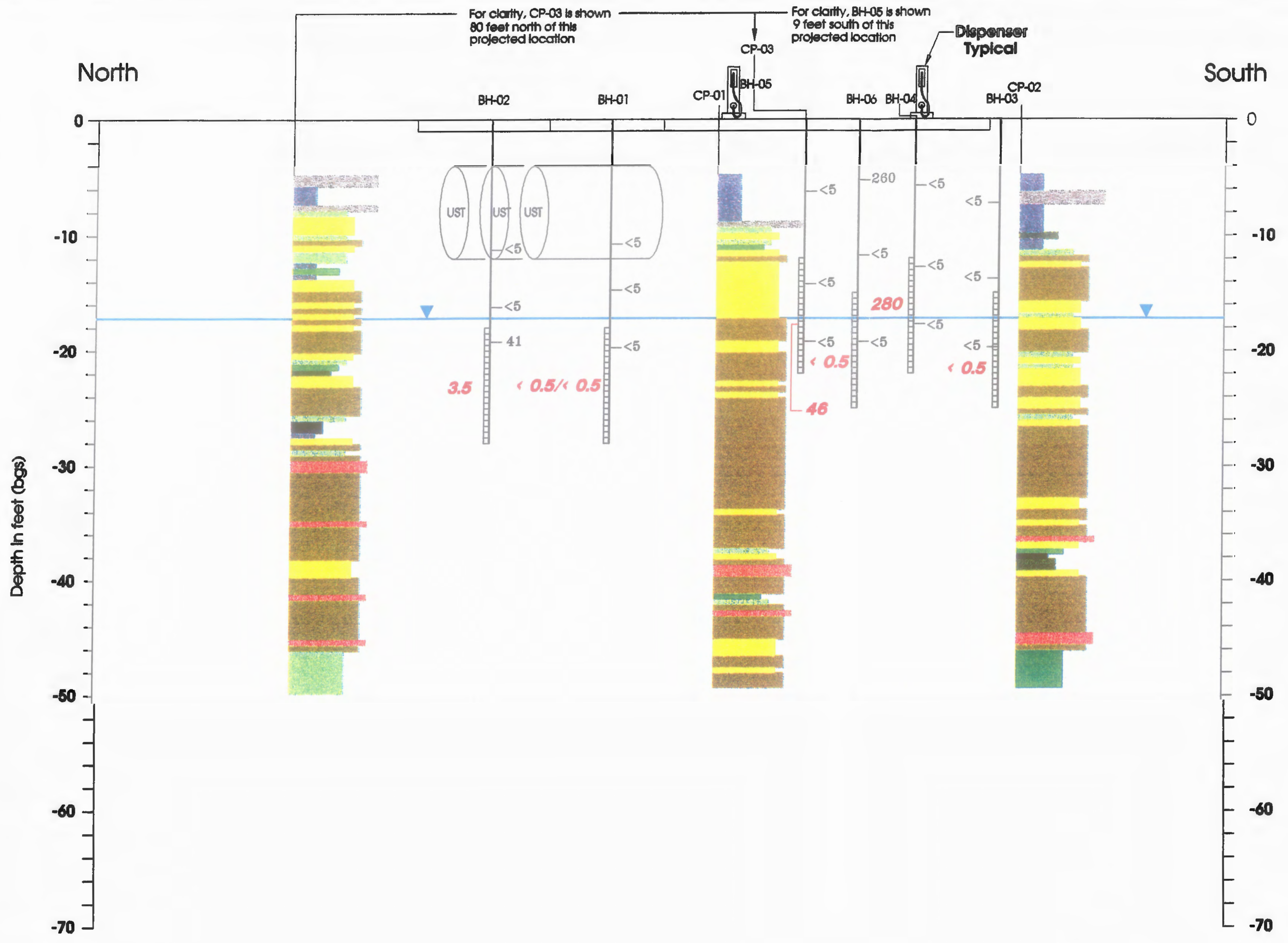
Site #598

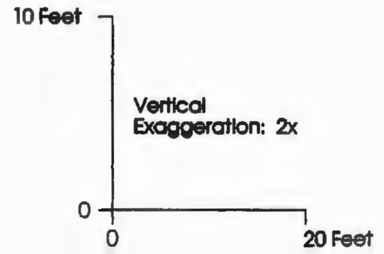
Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6





Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5	Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
▼	Shallowest measured depth to groundwater
UST	Underground storage tank
BH-01	Bore hole location
CP-01	Cone penetrometer test location

Borehole

- Soil sample location
- Temporary monitoring well screen

🟦	Clay, Silty Clay
🟩	Sandy Silt, Silt, Clayey Silt
🟥	Sand, Gravelly Sand, Silty Sand
▨	Stiff Fine Grained

NOTE: All CPT and Borehole locations are projected

Site #598

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 7

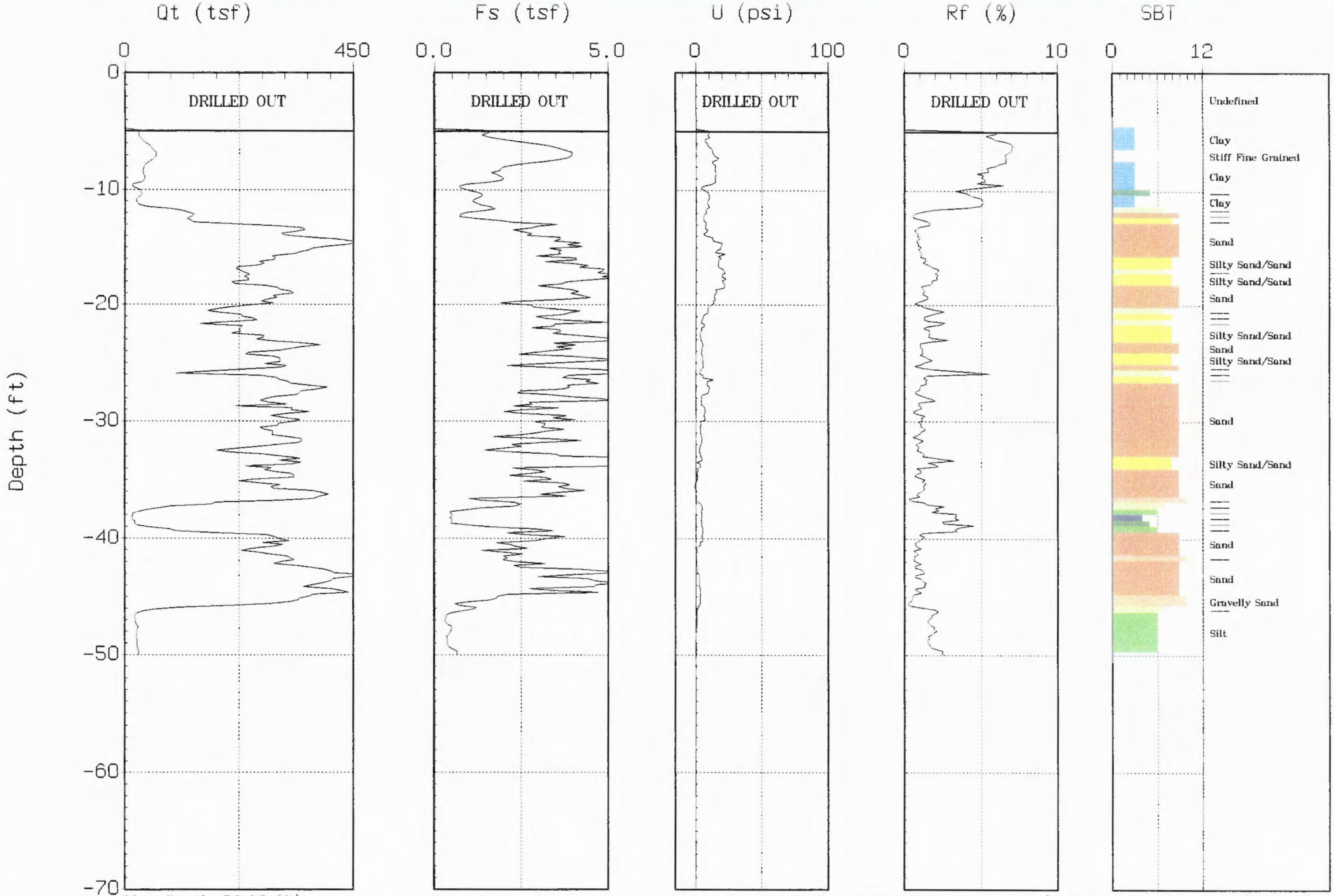
J:\ENGCAD\6730\CM#589.DWG 05/19/99 x-sec.PCP

GREGG

LFR LEVINE.FRICKE

Site: UNOCAL 598
Location : 598-CP-02

Geologist: Julie Sharp
Date : 03:12:99 10:36



Max. Depth: 50.03 (ft)

Depth Inc.: 0.164 (ft)

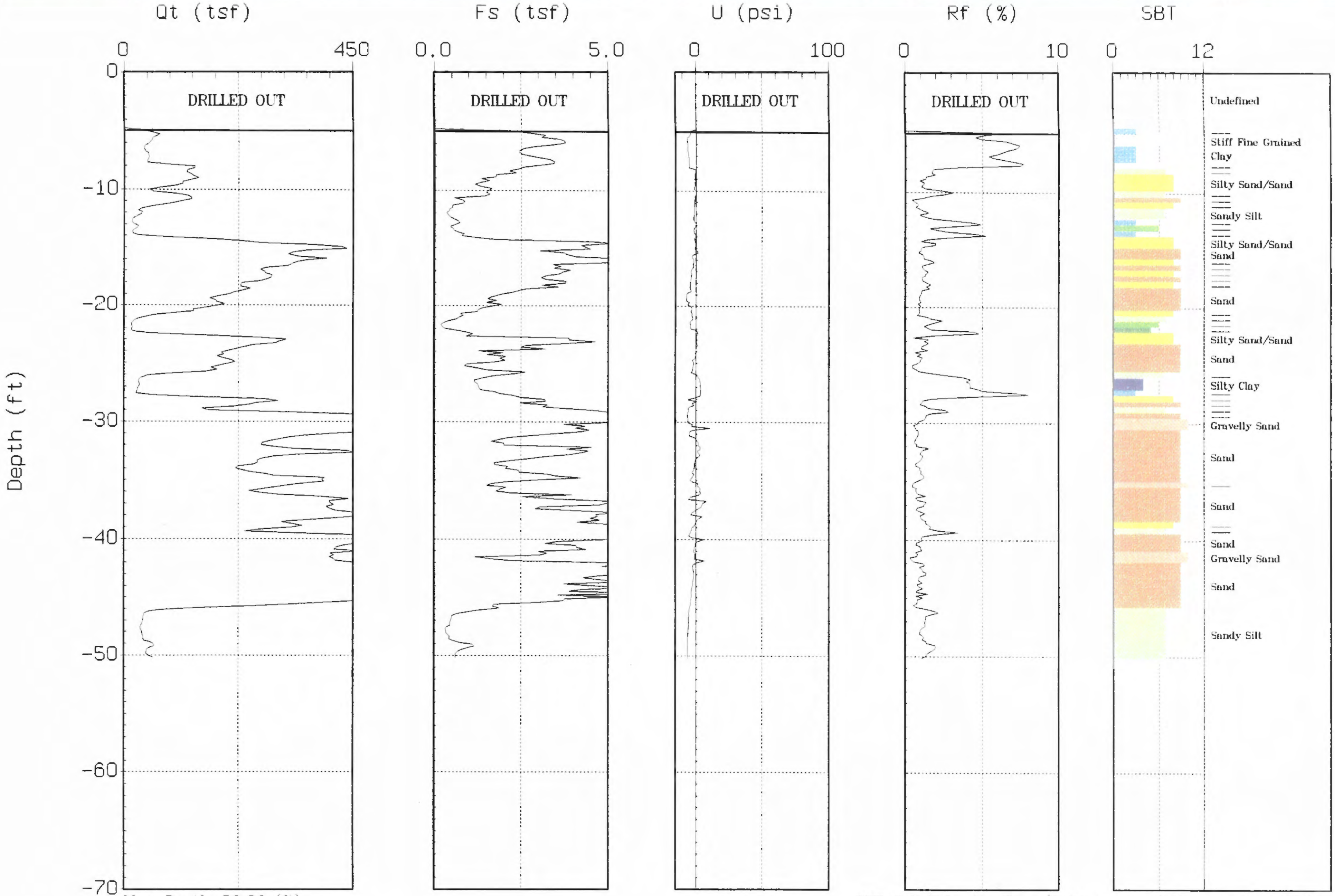
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: UNOCAL 598
Location : 598-CP-03

Geologist: Julie Sharp
Date : 03:12:99 12:21



Max. Depth: 50.20 (ft)

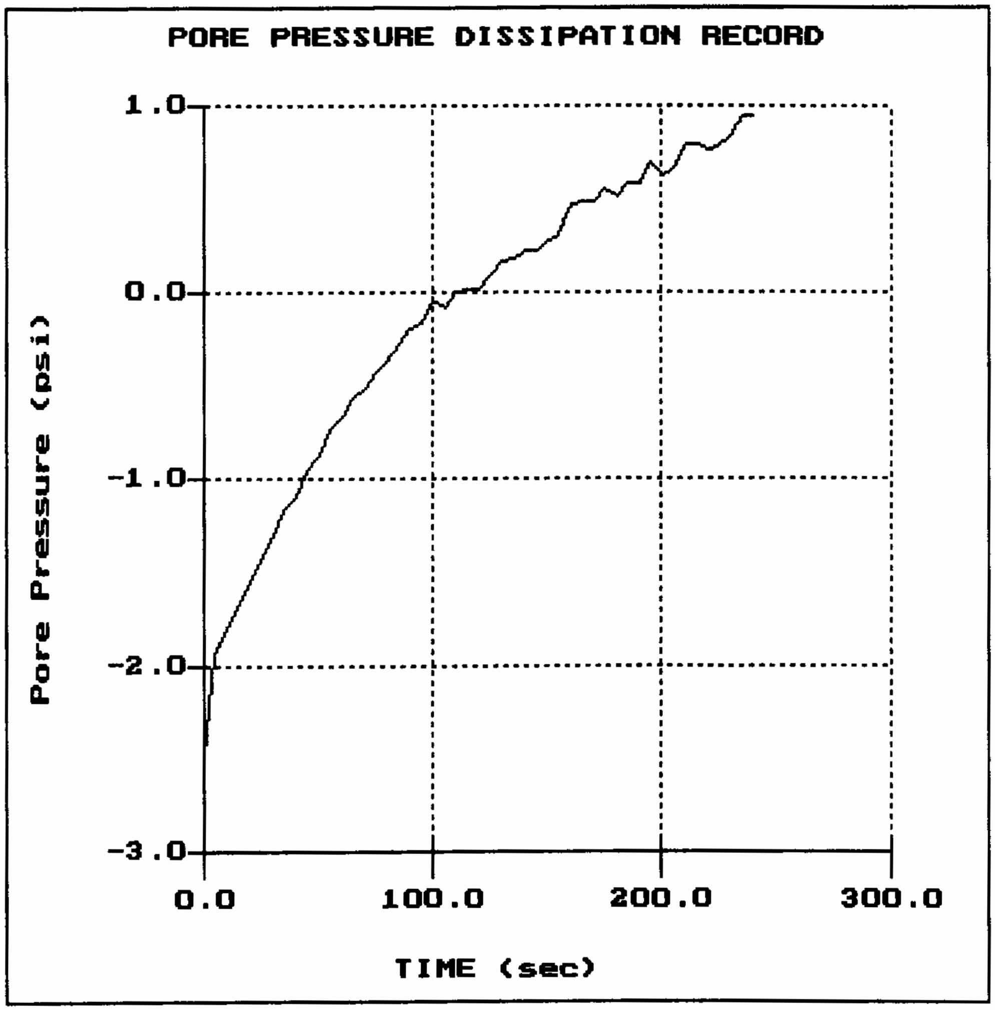
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:598-CP-01
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 08:45


PORE PRESSURE DISSIPATION RECORD

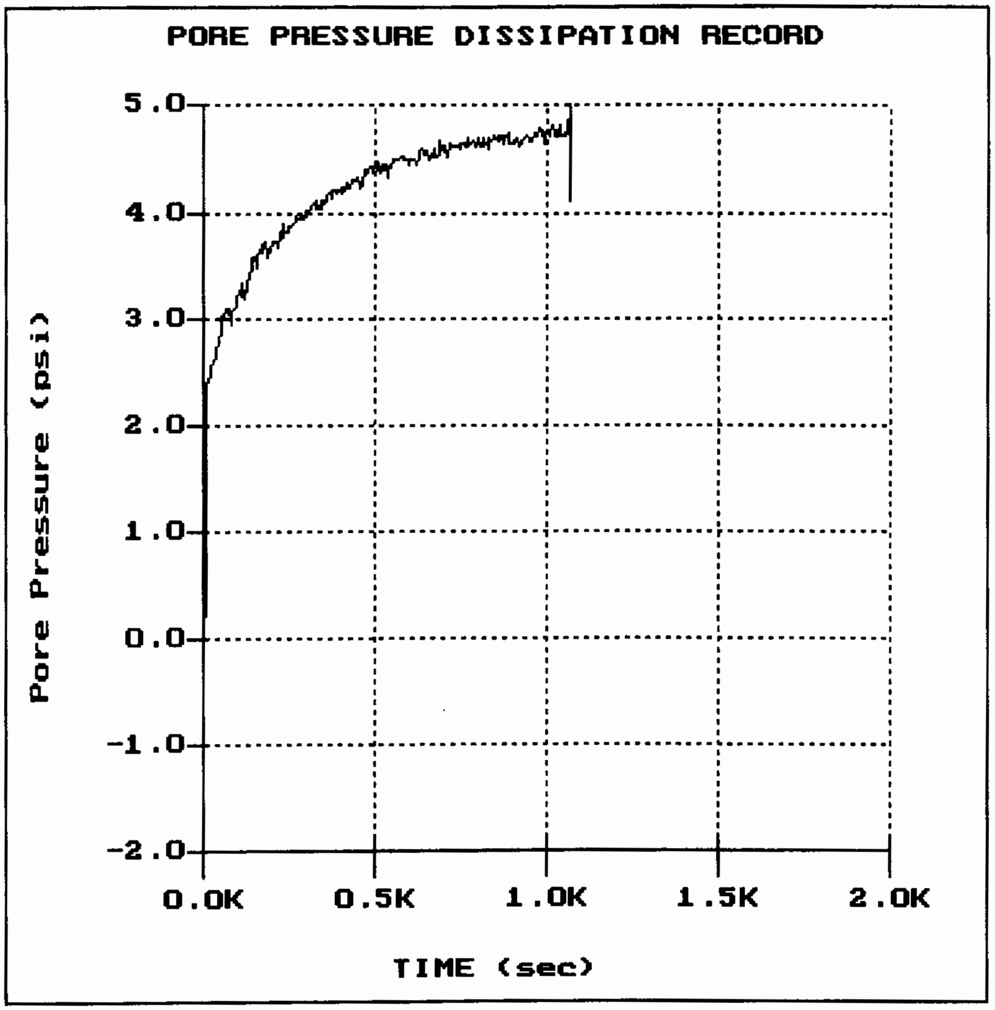
File: 027C05.PPR
Depth (m): 8.65
(ft): 28.38
Duration : 240.0s
U-min: -2.48 0.0s
U-max: 0.94 240.0s

LFR LEVINE FRICKE

Hole:598-CP-01
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 08:45

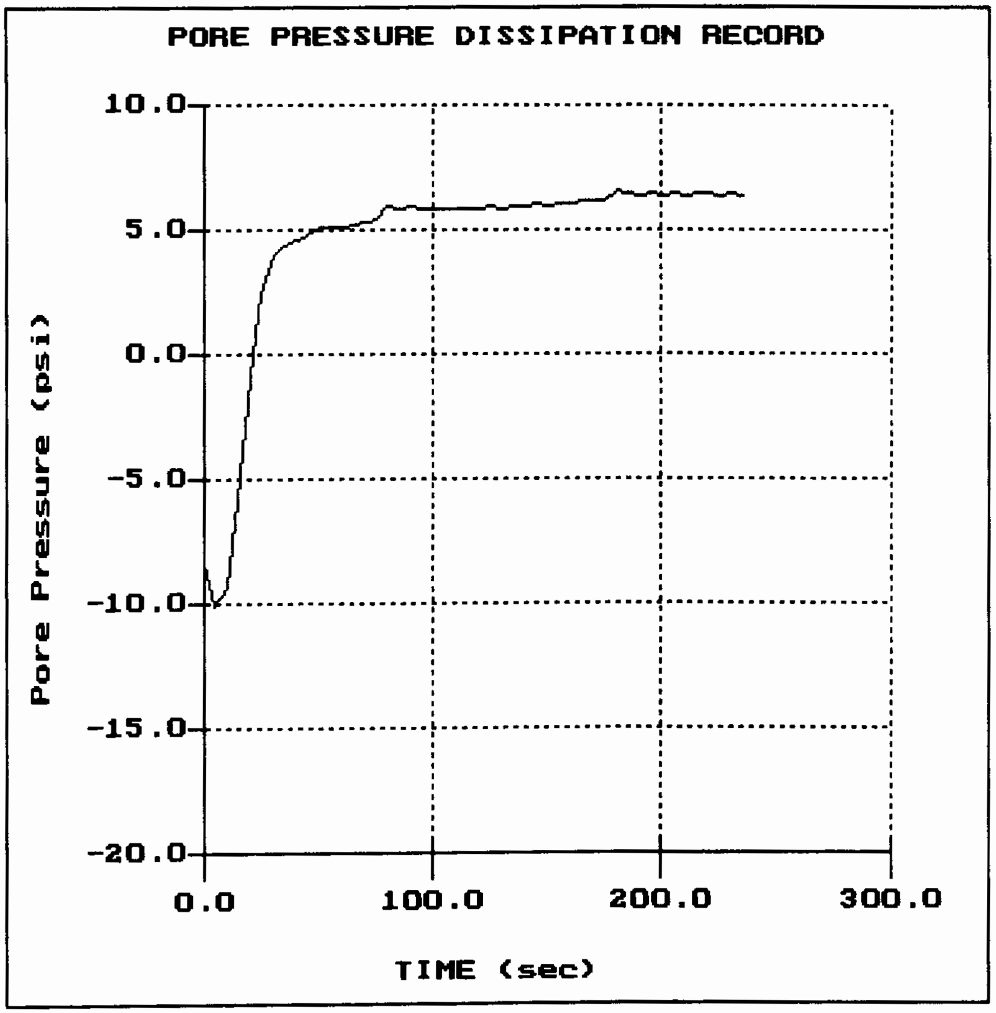
File: 027C05.PPR
Depth (m): 9.95
(ft): 32.64
Duration : 1070.0s
U-min: -1.93 0.0s
U-max: 5.00 1065.0s



LFR LEVINE FRICKE

Hole:598-CP-01
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 08:45

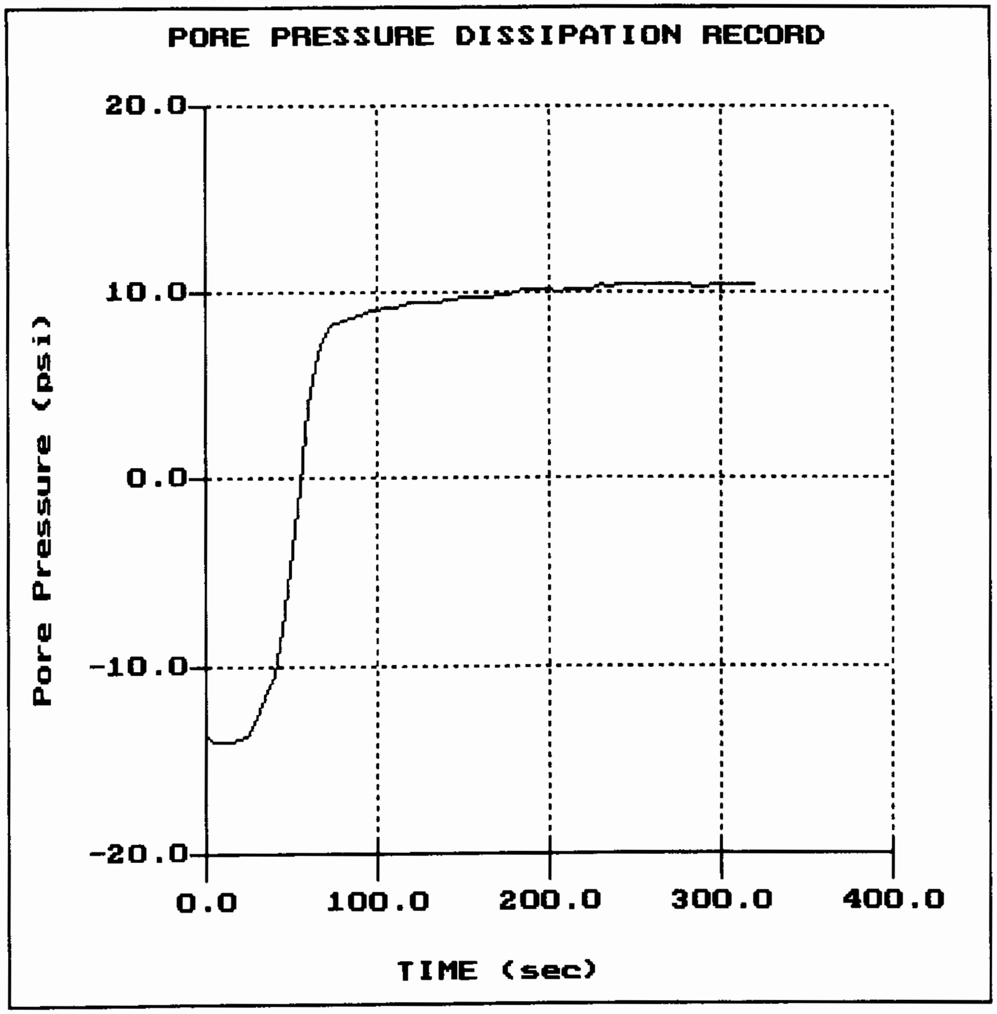


File: 027C05.PPR
Depth (m): 11.85
(ft): 38.88
Duration : 235.0s
U-min: -10.13 5.0s
U-max: 6.53 180.0s

LFR LEVINE FRICKE

Hole:598-CP-01
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 08:45

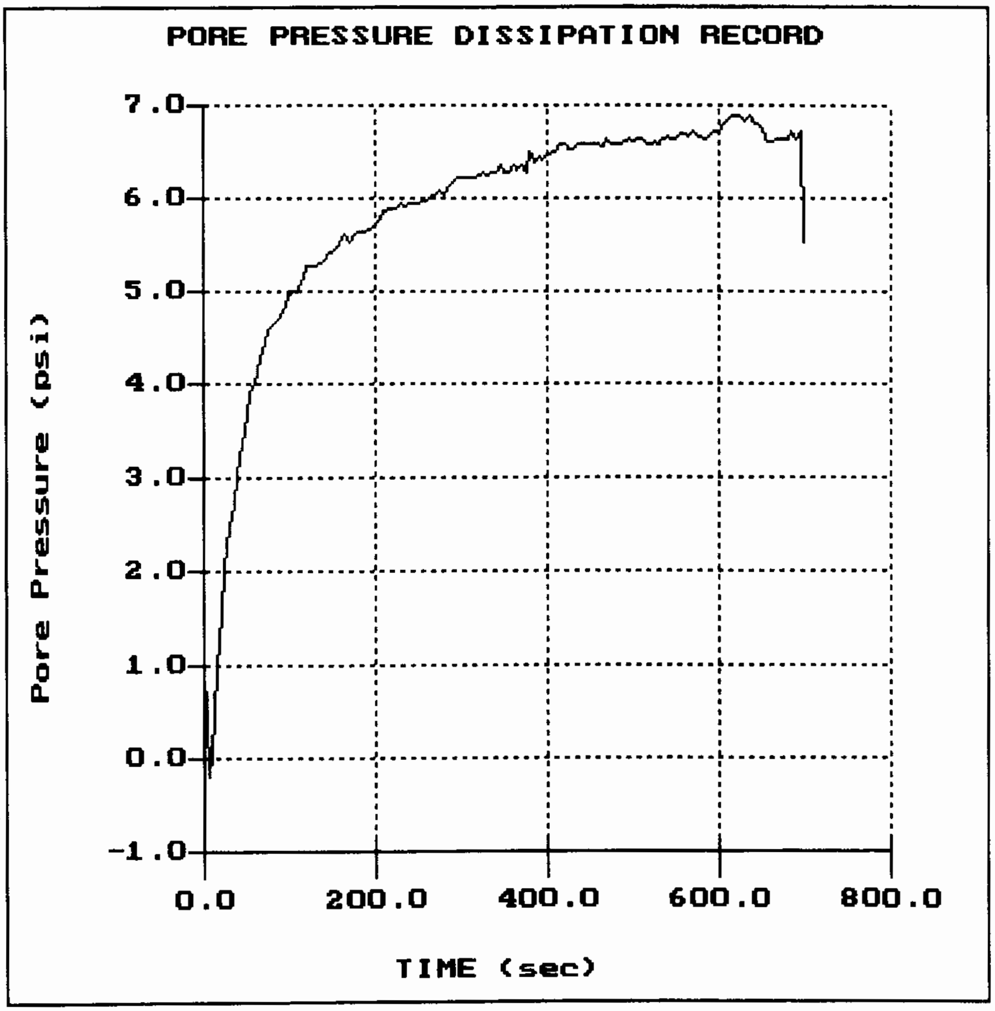


File: 027C05.PPR
Depth (m): 14.55
(ft): 47.74
Duration : 320.0s
U-min: -14.06 15.0s
U-max: 10.48 310.0s

LFR LEVINE FRICKE

Hole:598-CP-02
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 10:36

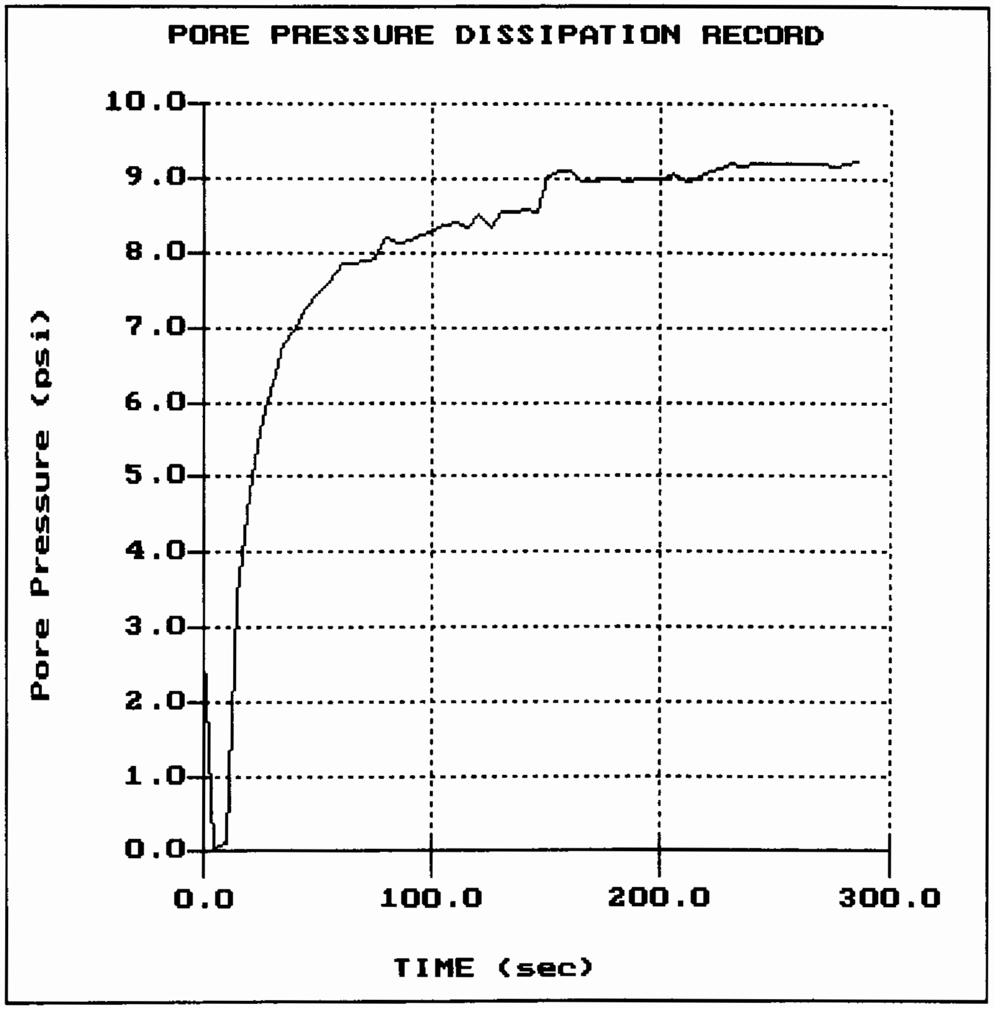


File: 027C06.PPR
Depth (m): 10.60
(ft): 34.78
Duration : 700.0s
U-min: -0.20 5.0s
U-max: 6.90 625.0s

LFR LEVINE FRICKE

Hole:598-CP-02
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 10:36

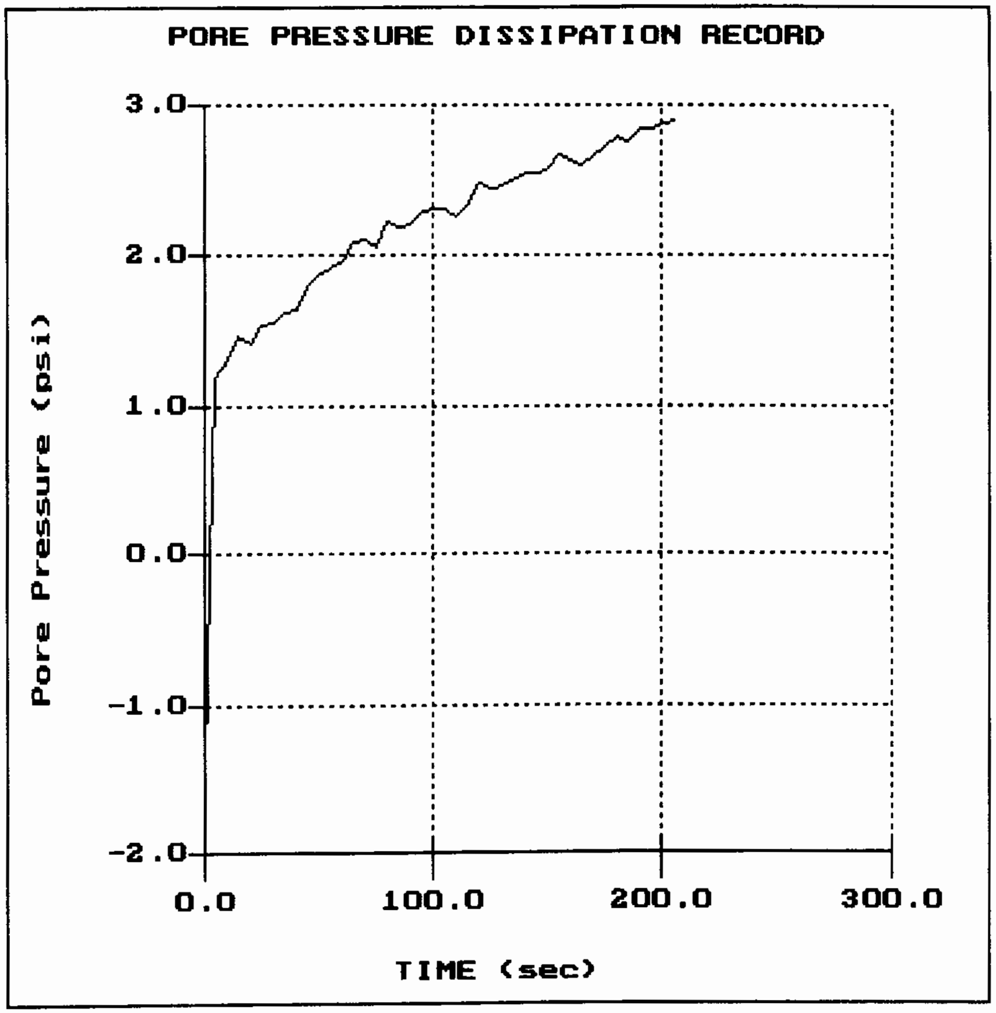

PORE PRESSURE DISSIPATION RECORD

File: 027C06.PPR
Depth (m): 12.30
(ft): 40.35
Duration : 285.0s
U-min: 0.04 5.0s
U-max: 9.22 285.0s

LFR LEVINE FRICKE

Hole:598-CP-03
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 12:21

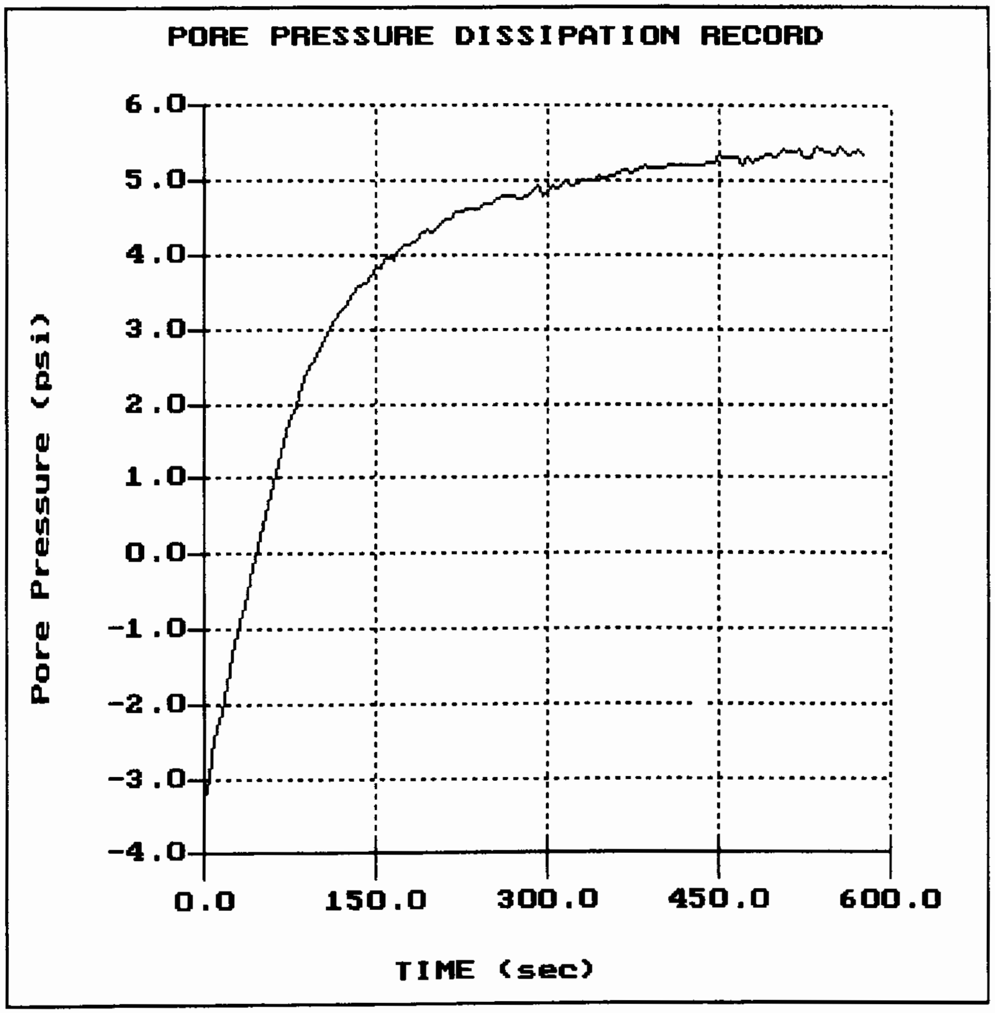

PORE PRESSURE DISSIPATION RECORD

File: 027C07.PPR
Depth (m): 7.70
(ft): 25.26
Duration : 205.0s
U-min: -1.44 0.0s
U-max: 2.89 205.0s

LFR LEVINE FRICKE

Hole:598-CP-03
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 12:21


PORE PRESSURE DISSIPATION RECORD

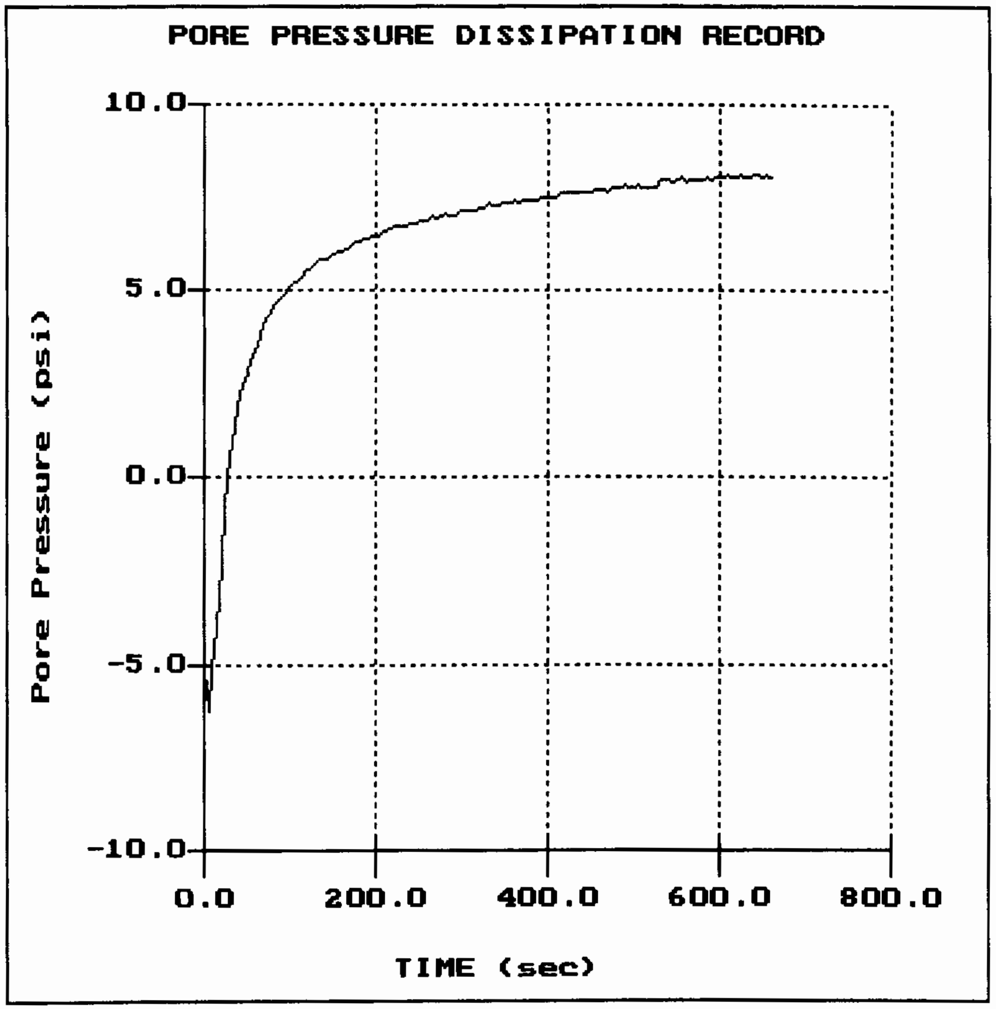
File: 027C07.PPR
Depth (m): 8.70
(ft): 28.54
Duration : 575.0s
U-min: -3.30 0.0s
U-max: 5.45 555.0s

LFR LEVINE FRICKE

Hole:598-CP-03
Location:ARCO 598

Cone: 20 TON AD046
Date:03:12:99 12:21

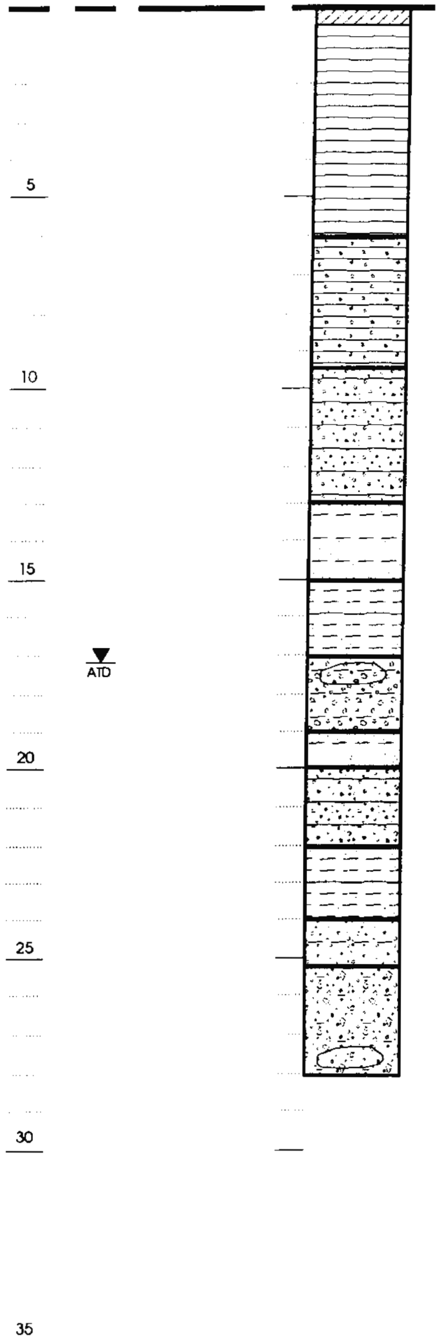
File: 027C07.PPR
Depth (m): 11.15
(ft): 36.58
Duration : 660.0s
U-min: -6.27 5.0s
U-max: 8.14 625.0s



PORE PRESSURE DISSIPATION RECORD

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT.

Clay.

CLAY (CL), brown, slightly moist, very stiff, medium plasticity.

GRAVELLY SANDY CLAY (CL), yellowish brown, slightly moist, stiff, low plasticity, coarse sand and fine gravel.

Poor recovery.

CLAYEY SANDY GRAVEL (GC), yellowish brown, slightly moist, dense, well graded subrounded gravel to 3 centimeters, coarse subangular sand.

SILTY SAND (SM), yellowish brown, moist, medium dense, poorly graded, very fine to coarse sand, some clay.

CLAYEY SANDY SILT (ML), yellowish brown, moist, stiff, very low plasticity, fine sand.

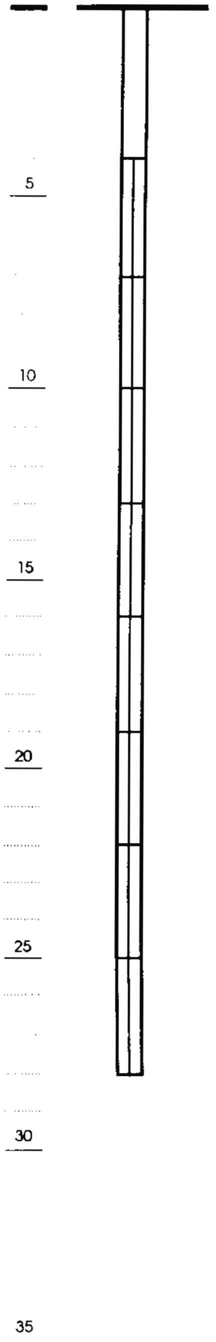
COBBLE.
SILTY GRAVEL (GM), yellowish brown and grayish brown, slightly moist, very dense, well graded, subangular/subround, clasts to 4 centimeters, some clay.
SILTY SAND (SM), grayish brown, very moist, loose, well graded, subangular, coarse grained.
CLAYEY SANDY GRAVEL (GC), yellowish brown, very moist, medium dense, well graded subangular/subround to 3 centimeters.

CLAYEY SANDY SILT (ML), yellowish brown mottled with grayish tan, very moist, very soft, low plasticity.

SILTY GRAVELLY SAND (SM), brownish gray, moist, very dense, well graded.
SILTY SANDY GRAVEL (GM), brownish gray, very moist to wet, medium dense, well graded, gravel clasts to 4 centimeters.

COBBLE.

BOTTOM OF BORING AT 28 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 22, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
░ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

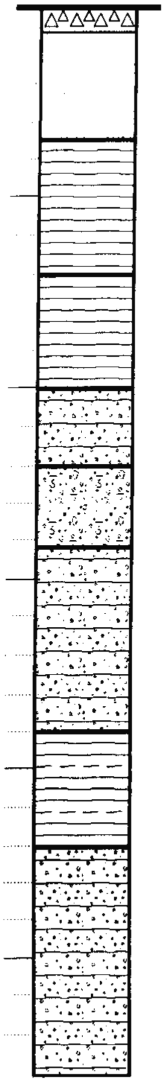
LFR
LEVINE•FRICKE

LITHOLOGY FOR 598-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval



8-inch thick CONCRETE.

SAND, trace gravel (Fill).

CLAY (CL), grayish brown, moist, very soft, very stiff, high plasticity.

SANDY CLAY (CL), yellowish brown, moist, soft, medium plasticity, coarse subrounded sands.

CLAYEY GRAVELLY SAND (SC), light yellowish brown, very moist, medium dense, well graded, subangular.

SILTY SANDY GRAVEL (GM), light yellowish to grayish brown, slightly moist, dense, well graded, angular, heterogenous.

CLAYEY GRAVELLY SAND (SC), yellowish brown, slightly moist, hard, coarse grained, subangular, gravel clasts to 1 centimeter.

Very moist.

▼ ATD

SILTY CLAY (CL), yellowish brown mottled with tan and gray, very moist, very soft, high plasticity, trace sand and gravel.

CLAYEY SANDY GRAVEL (GC), light grayish brown to yellowish brown, very moist to wet, medium dense, well graded, subangular, clasts to 2 centimeters.

Very moist to wet, very dense.

BOTTOM OF BORING AT 28 FEET.

5
10
15
20
25
30
35

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 22, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ⚋ Silt
- ▒ Sand
- ▓ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

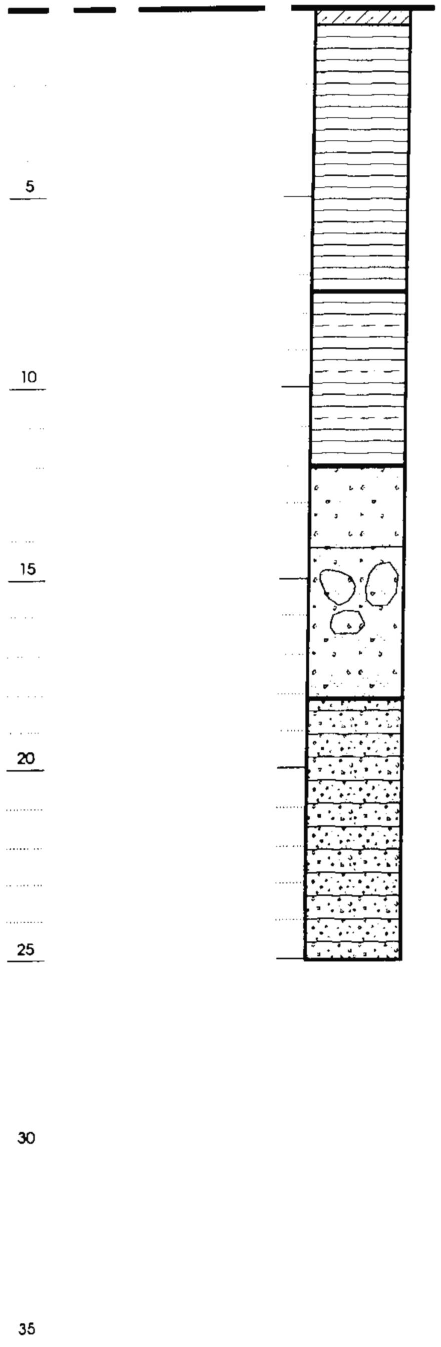
LFR
LEVINE•FRICKE

LITHOLOGY FOR 598-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT.

CLAY (CL), dark brown, slightly moist, very stiff, low plasticity, color changes to yellowish brown.

SILTY CLAY (CL), light yellowish brown, slightly moist, hard, very low plasticity.

GRAVELLY SAND (SW), yellowish brown, slightly moist to moist, medium dense, subangular, well graded sand, gravel clasts to 2 centimeters.

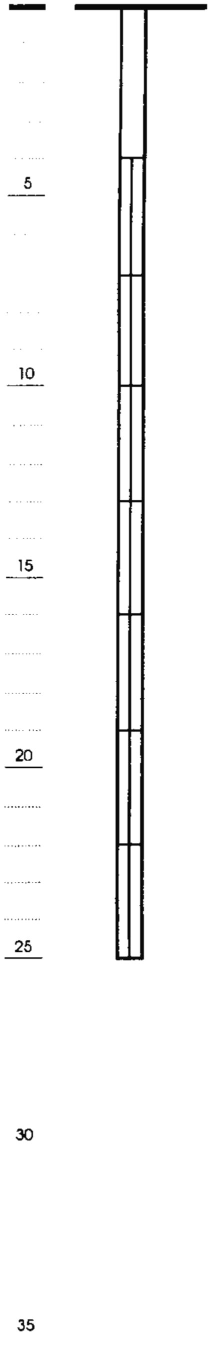
Some clay, moist.

COBBLES.

CLAYEY SANDY GRAVEL (GC), yellowish brown, very moist, very dense, well graded, subangular, gravel clasts to 3 centimeters.

Wet.

BOTTOM OF BORING AT 25 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 22, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▭ Silt
- ░ Sand
- ▒ Gravel

PID -Photoionization Detector

▼ Water level at time of drilling

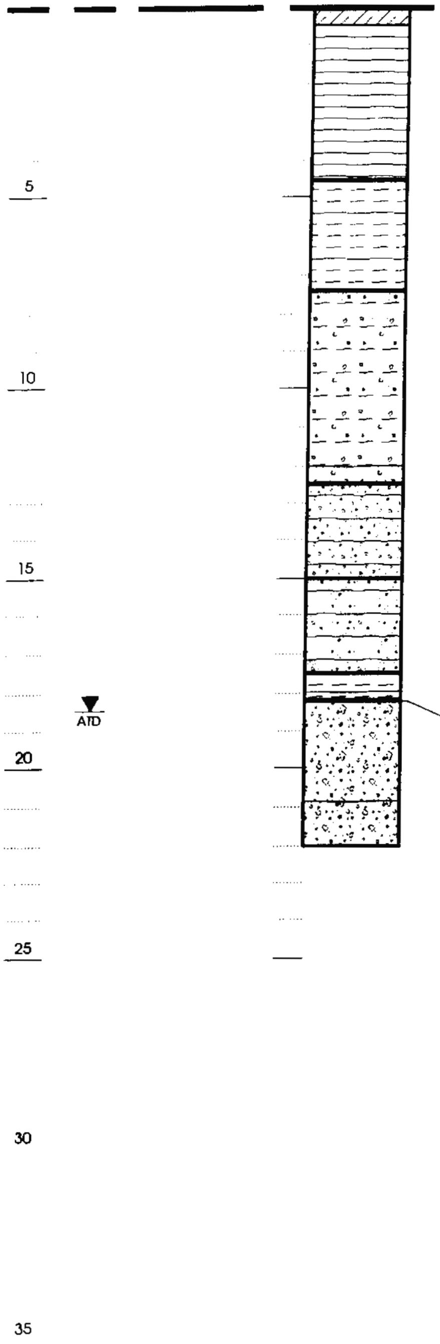
LFR LEVINE•FRICKE

LITHOLOGY FOR 598-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval



ASPHALT.

CLAY (CL), brown to grayish brown, moist, medium stiff, low plasticity.

CLAYEY SILT (ML), yellowish brown, slightly moist, stiff, very low plasticity.

SILTY GRAVELLY SAND (SM), dark yellowish brown, moist, dense, well graded, angular sand, subrounded gravel clasts to 1 centimeter.

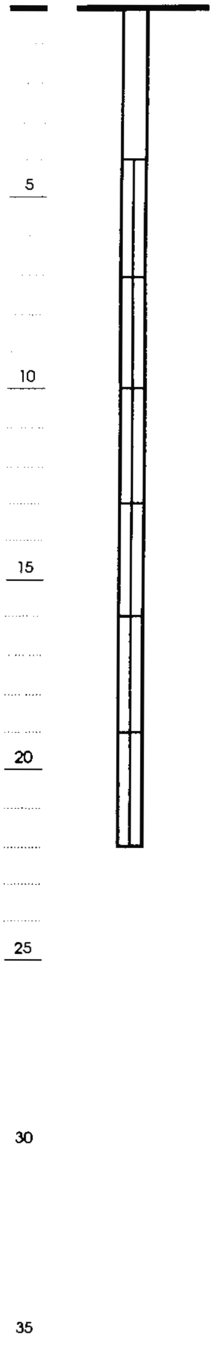
Increase clay content.
CLAYEY SANDY GRAVEL (GC), yellowish brown, moist, medium dense, poorly graded, coarse subrounded gravel, well graded sand.

GRAVELLY CLAYEY SAND (SC), as above, very moist, coarse sand.

CLAYEY SILT (ML), reddish brown mottled with light yellowish brown, moist, medium stiff, low plasticity.
SANDY GRAVEL (GW), yellowish brown, very moist to wet, subangular, well graded sand, gravel clasts to 2 centimeters, some clay.

Increased clay.

BOTTOM OF BORING AT 22 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ☰ Silt
- ▒ Sand
- ▒ Gravel

PID - Photoionization Detector

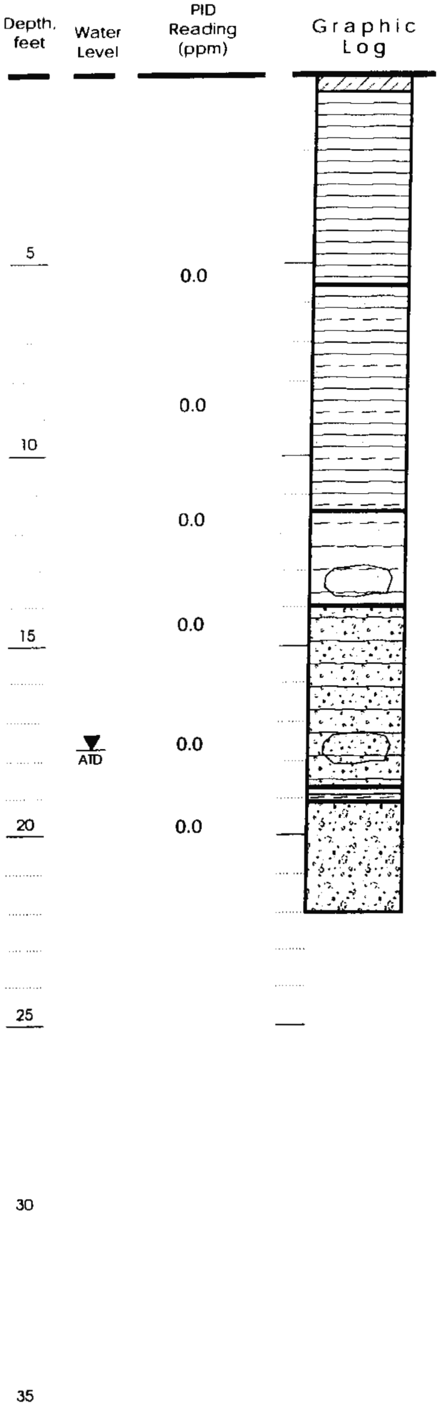
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 598-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Lithologic Description

ASPHALT.

CLAY (CL), dark brown, slightly moist, very stiff, very low plasticity.

SANDY SILTY CLAY (CL), dark yellowish brown, slightly moist, very stiff, slight plasticity, less than 10% sand, trace coarse sand.

Increased fine sand.

CLAYEY SILTY SAND (SC), light yellowish brown with dark yellowish brown mottling, slightly moist, very dense, very fine to medium grained, trace coarse sand and gravel, cobble at 13.3 feet.

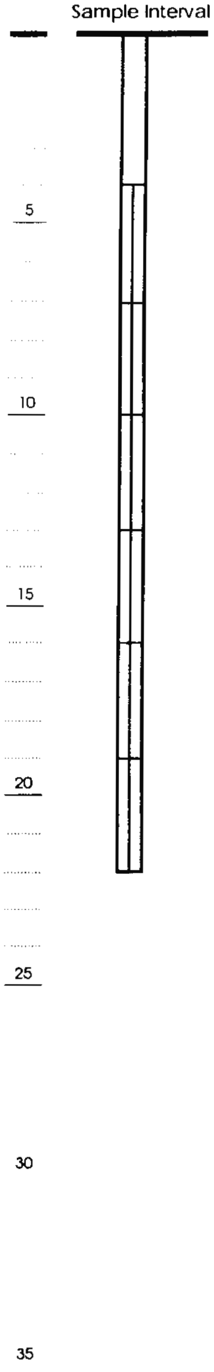
CLAYEY SANDY GRAVEL (GC), moist, well graded, angular gravel, clasts to 1.5 centimeters.

COBBLE.

CLAYEY SILT (ML), yellowish brown.

SANDY GRAVEL (GW), grayish brown, very moist to wet, dense, well graded, subangular to subrounded gravel, clasts to 2 centimeters, coarse sand.

BOTTOM OF BORING AT 22 FEET.



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
┅	Silt
░	Sand
▒	Gravel

PID -Photoionization Detector

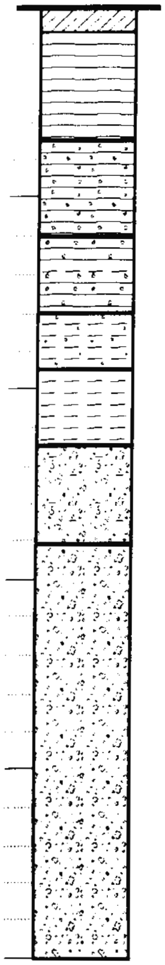
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 598-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			CLAY.
5			GRAVELLY CLAY (CL), dark grayish brown, very moist, soft, medium plasticity, mild gasoline odor.
		0.0	
			GRAVELLY SILTY CLAY (CL), dark brown, mottled dark yellowish brown, slightly moist, very stiff, slight plasticity, subrounded gravel, clasts to 1.5 centimeters.
			CLAYEY SILT (ML), yellowish brown, slightly moist, very stiff, non plastic, friable.
		0.0	
10			SANDY SILT (ML), yellowish brown mottled with tan, moist, very stiff, very low plasticity, fine sand.
		0.0	
			SILTY SANDY GRAVEL (GM), yellowish brown, moist, medium dense, well graded subangular, clasts to 1.5 centimeters, coarse sand.
15		0.0	SANDY GRAVEL (GW), light grayish brown, slightly moist, dense, well graded, angular sand and gravel, clasts to 2.5 centimeters.
	▼ ATD		
		0.0	
20			
		0.0	
			Very moist, coarse sand, gravel clasts to 3 centimeters.
		0.0	
25			BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 598-BH-06 *(page 1 of 1)*

Project No. 6730.00-024